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Table of Contents

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ORIGINAL ARTICLES—	PAGE.	ABSTRACTS FROM CURRENT MEDICAL LITERATURE—	PAGE.
"Observations on the Certainly Lethal Dose of the Venom of the Black Snake (<i>Pseudechis Porphyriacus</i>) for the Common Laboratory Animals," by C. H. KELLAWAY, M.C., M.D., M.S., F.R.C.P.	33	Ophthalmology	56
"Mineral Content of the Developing Avian Embryo," by WINIFRED R. MANKIN, M.Sc.	41	Laryngology and Otology	56
"Acute Mastoiditis," by ATHOL BLAUBAUM, M.B., B.S., F.C.S.A.	48	SPECIAL ARTICLES ON DIAGNOSIS—	
REPORTS OF CASES—		Intussusception	58
"Autotransfusion in Ruptured Ectopic Pregnancy," by BERNARD DAWSON, M.D., F.R.C.S.	49	BRITISH MEDICAL ASSOCIATION NEWS—	
"Endemic Typhus Fever," by E. L. NEWMAN, M.B.	50	Scientific	59
"Pulmonary Abscess Treated by Artificial Pneumothorax," by NORMAN J. SOLOMON, M.B., B.S.	51	Medico-Political	64
REVIEWS—		Nominations and Elections	64
Immunology	51	OBITUARY—	
Catarrh of the Nose	51	Cyril Shepherd	64
Advances in Medicine	52	MEDICAL SOCIETIES—	
NOTES ON BOOKS, CURRENT JOURNALS AND NEW APPLIANCES—		The Medical Women's Society of New South Wales	66
A Platinum Resistance Thermometer	52	POST-GRADUATE WORK—	
Manuals on Diabetes	52	The Royal College of Surgeons of England	67
LEADING ARTICLES—		CORRESPONDENCE—	
An Opportunity for Surgeons	53	Uterine Inertia	68
An Explanation	54	Cases Resembling Laryngeal Diphtheria	68
CURRENT COMMENT—		Modern Views on Some Obstetrical and Gynaecological Problems	69
The Use of Charcoal in the Uterus	54	A Long Umbilical Cord	69
Urobilinuria	54	CONGRESS NOTES—	
		American Congress of Physical Therapy	69
		BOOKS RECEIVED—	
		DIARY FOR THE MONTH	70
		MEDICAL APPOINTMENTS	70
		MEDICAL APPOINTMENTS VACANT, ETC.	70
		MEDICAL APPOINTMENTS: IMPORTANT NOTICE	70
		EDITORIAL NOTICES	70

OBSERVATIONS ON THE CERTAINLY LETHAL DOSE OF THE VENOM OF THE BLACK SNAKE (*PSEUDECHIS PORPHYRIACUS*) FOR THE COMMON LABORATORY ANIMALS.¹

By C. H. KELLAWAY, M.C., M.D., M.S., F.R.C.P.
(From the Walter and Eliza Hall Institute, Melbourne.)

THE researches of Martin⁽¹⁾ have given us a very complete knowledge of the mode of action of the venom of the black snake, *Pseudechis porphyriacus*. When injected intravenously in sufficient dosage it causes rapid death by intravascular coagulation. It has a powerful hæmolytic action, very strikingly shown in the dog, and attacks also the endothelial lining of the blood vessels causing hæmorrhages into the organs. When it is injected subcutaneously or intravenously, after destruction of the "thrombase" by heat, its neurotoxic action is manifested in a lessening of the reflex activity of the central nervous system and notably in paralysis of the respiratory centre, causing death by respiratory failure. If life

be maintained by artificial respiration the additional action on the heart becomes evident, death occurring shortly by cardiac failure with a profound fall of blood pressure which is only partly of vasomotor origin.

The study of the immunity response to this venom demands more data concerning the dosage in which it exerts its lethal effects than are to be found in the literature of the subject. Tidswell's⁽²⁾ results of subcutaneous injection in the rabbit indicate a lethal dose of more than 0.6 milligramme per kilogram, two out of four animals dying following the injection of this dose of venom. Martin's experiments with dogs and rabbits showed that in the dog 0.2 and in the rabbit 0.5 milligramme per kilogram were regularly fatal when injected intravenously. Fairley's⁽³⁾ observations on sheep suggest that the certainly lethal dose for this animal by subcutaneous injection is approximately 0.8 milligramme per kilogram. In the present paper a number of observations on the rabbit, guinea-pig, rat and mouse have been recorded and a few on the horse, monkey and cat, together with brief

¹ This research was carried out under a grant from the Department of Health, Commonwealth Government.

notes of the symptoms and gross pathological findings in these animals.

EFFECTS IN THE HORSE.

It was of some interest to ascertain whether it were likely that large animals could be killed by being bitten by this snake which, in spite of its formidable size (up to 195 centimetres or six feet six inches in length), yields only moderate quantities of venom. For this snake Fairley and Splatt⁽⁴⁾ found an average yield in captivity of 31.4 milligrammes and the maximal yield from any one snake was 74.7 milligrammes.

A horse weighing 550 kilograms received by subcutaneous injection 105 milligrammes (0.19 milligramme per kilogram). During the first twenty-four hours following the injection a local swelling appeared at the site of the injection (the subcutaneous tissues at the side of the neck) which increased in size, reaching its maximum in forty-eight hours. Apart from hæmaturia during the first twenty-four hours, the animal exhibited no other symptoms of illness and appeared to be quite fit after two days.

It seemed unlikely that horses would be killed by the bite of this snake unless the venom were injected by ill chance into a vein. A much smaller dose administered intravenously caused a fatal result.

A horse weighing 840 kilograms received twenty milligrammes of the venom intravenously into the jugular vein and died in less than twenty hours following the injection. There were no immediate symptoms. Samples of blood taken from the jugular vein of the uninjected side, clotted in the following times:

- 21 minutes after injection, 6 minutes (firm)
- 41 minutes after injection, 16 minutes (soft)
- 1 hour after injection, 21 minutes (soft)
- 7 hours after injection, 25 minutes (soft)

The only symptom observed during the first twelve hours was hæmoglobinuria which commenced after three hours. The animal's death was unexpected and took place during the early hours of the morning.

Post Mortem Findings.

On *post mortem* examination (not more than seven hours after death) it was found that *rigor mortis* had set in and there was *post mortem* clotting in the large vessels. There was hæmorrhagic œdema of the lungs with large areas of hæmorrhage. The trachea and bronchi were filled with blood-stained froth and their mucous lining was very congested. The heart showed numerous hæmorrhages throughout the muscle and its endothelial lining and that of the great vessels were deeply stained with blood pigment. The spleen showed a "black currant jam" appearance on section and the kidneys were intensely congested, with much interstitial hæmorrhage and hæmoglobin staining of their substance. Outside the capsules of both there was also extensive hæmorrhage.

The fatal result in this animal must have been largely determined by the hæmolysis which was everywhere evident, and by the intense hæmorrhagic œdema of the lungs. Unfortunately the terminal symptoms were not observed.

EFFECTS IN THE MONKEY (MACACUS RHEBUS).

A few observations were also made in this species, the results of which are set out in Table I.

TABLE I.
Result of Subcutaneous Injection in Monkeys.

Weight in Kilograms.	Dose in Milligrammes per Kilogram.	Result.
4.0	1.0	Died in between five and six hours.
2.6	0.8	Died in six and a half hours.
2.9	0.5	Moderately severe symptoms, recovered.

The venom was injected in a concentration of ten milligrammes per cubic centimetre into the subcutaneous tissue of the leg. The lethal dose appears to lie between 0.5 and 0.8 milligramme per kilogram.

The Symptoms.

The earliest symptom observed is ptosis. In the monkey which recovered, ptosis was evident three hours after the injection. After six hours there were slight cyanosis and increasing drowsiness. The animal sat with its head nodding forward and though there was some general weakness and loss of tone, at all times it responded well to external stimuli. Improvement commenced after nine hours and recovery was complete twenty hours after the injection.

In both the other animals there was bilateral ptosis within two hours and in both there were no other symptoms till shortly before death which took place suddenly and was not actually observed.

Post Mortem Findings.

On *post mortem* examination the lungs were congested in one animal and contained numerous hæmorrhages in the other. The liver and kidneys were also congested. The blood was fluid and the clotting time slightly delayed (eight minutes). There were no clots in the heart or great vessels. At the site of injection there were some œdema and slight hæmorrhage. The urine in the bladder contained neither blood cells nor pigment.

EFFECTS IN THE CAT.

The cat is extremely resistant to this venom.

The results of subcutaneous injection in the tissues of the abdominal wall are set out in Table II. The first six animals received the venom in a concentration of twenty milligrammes per cubic centimetre and the remainder in a concentration of five milligrammes per cubic centimetre.

The observations are too few in number for the determination of the certainly lethal dose which appears to be between seven and ten milligrammes per kilogram.*

TABLE II.
Results of Subcutaneous Injection in Cats.

Weight in Kilograms.	Dose in Milligrammes per Kilogram.	Result.
1.96	10.0	Died in twenty-five hours.
2.63	9.0	Died on the fifth day.
3.39	8.0	Died in between fifty-eight and seventy hours.
4.54	7.0	Died in between fifty-eight and seventy hours.
2.37	6.0	Except anorexia, no definite symptoms; recovered.
3.5	5.0	Died on the sixth day.
3.3	4.0	Slight dyspnoea during first twenty-four hours; recovered.
2.11	4.0	No symptoms; recovered.
3.1	3.0	Vomited shortly after injection; no other symptoms; recovered.

The Symptoms.

One or two animals vomited within a few minutes after the injection. In the animal which died in twenty-five hours, there were dyspnoea, paresis of the hind limbs and weakness of the fore limbs after twenty-one hours. Death took place from respiratory failure. In the animals which died on the third day, the symptoms were predominantly respiratory and after twenty-four hours dyspnoea was the most striking symptom. The nose was wet with excessive secretion from the nostrils and mouth or from the respiratory passages. At this time there were slight weakness and ataxia in the movements. After forty-eight hours there was obvious paresis of the limbs and the respiratory symptoms had not abated. One cat which received 5.0 milligrammes per kilogram and died on the sixth day, presented no symptoms other than hæmoglobinuria and anorexia till the fifth day. In it the cause of death was pneumonia. The animal which died on the fifth day after a dose of nine milligrammes per kilogram, also remained moderately well for three days, its only symptoms being anorexia and a severe degree of hæmoglobinuria. On the fourth day there was general weakness, but no paralysis. The symptoms which preceded death, were wholly respiratory. The animals which survived, presented no definite symptoms, except that they went off their food for twenty-four hours and were somewhat quiet. All had some degree of swelling at the site of injection.

Post Mortem Findings.

At *post mortem* examination the blood was fluid in the heart and great vessels and the coagulation time was greatly delayed. In the cat which died in twenty-five hours, the clotting time was one hour and twenty minutes and in the two which died on the third day, it was twenty-one and fifteen minutes respectively. In all, the lungs were almost completely collapsed and contained numerous hæmorrhages. In one animal there was a pneumothorax, gas escaping under pressure when the thorax was opened. Four out of five of the cats which died, had hæmoglobinuria and the kidneys were congested and stained with blood pigment. The liver was congested and the spleen was black. There were numerous hæmorrhages in the mesentery and endo-

cardium in the animals which died early. In all, there were extensive hæmorrhage and œdema at the site of injection.

The animal which received five milligrammes per kilogram, presented at autopsy an extensive area of œdema of the abdominal wall which had partly absorbed. The tissues were stained with altered blood pigment. The left lower lobe of the lung was consolidated and there was extensive collapse in the remaining lung tissue. The kidneys were congested and the bladder contained blood-stained urine. Similar changes were observed in the cat which died on the fifth day except that the lungs showed only collapse and hæmorrhage.

EFFECTS IN THE RABBIT.

The Effect of Intravenous Injection.

The effect of intravenous injection of this venom was fully investigated by Martin⁽⁵⁾ in both the dog and rabbit. He showed that the rate of injection influenced the result—very slow injection or that of very small amounts leading to the production of a negative phase. The injection of a dose not too large and not too rapidly administered confers immunity (as far as intravascular clotting is concerned) to subsequent doses. As with Woolridge's "tissue fibrinogen," in fasting animals the coagulation produced by an efficient dose may be limited to the portal veins, whereas after a meal the same dose produces general intravascular clotting.

In my experiments the animals were all in the fed condition and the extent of the coagulation observed in the venous system and in the heart appeared to depend in part on the size of the dose.

The rabbits used were similar to those used for tests of other venoms and were domestic and not wild strains. The venom was administered in a concentration of 0.2 milligramme per kilogram. The results are set out in Table III.

TABLE III.
The Effects of Intravenous Administration in Rabbits.

Number of Animals.	Average Weight in Kilograms.	Dose in Milligrammes per Kilogram.	Result.
2	1.86	0.25	One died in two minutes and one in two and a half minutes.
1	1.52	0.2	Died in one and a half minutes.
1	1.44	0.15	Died in one and three-quarter minutes.
5	1.44	0.12	Died in two and a quarter, two and a quarter, three, three and a half and nine and a half minutes.
4	1.66	0.11	Died in one and three-quarter, one and three-quarter, two and two and a quarter minutes.
7	1.55	0.10	Four died in two, three, three and four minutes, and three survived.
1	2.55	0.07	No symptoms; survived.
6	1.51	0.05	Five died in two and a half, three, three, four and a half and eight minutes, and one survived without symptoms.
2	1.31	0.04	One died in three and a half minutes and one in seven hours.
2	1.33	0.02	No symptoms; all survived.

The observations are too few for the accurate determination of the certainly lethal dose which appears to be in the region of 0.11 milligramme per

kilogram. Young animals (1.2 to 1.5 kilograms) are killed moderately regularly with half this dose, but occasionally larger animals (1.8 to 2.0 kilograms) survive after doses from 0.05 to 0.1 milligramme per kilogram.

The Symptoms.

The symptoms are very striking and have been described by Martin and others. After a latent period lasting from thirty seconds to several minutes during which the only sign may be a certain restlessness or uneasiness, the animal either takes a rapid run of a few steps and falls over on its side in convulsions or falls down at once abruptly on to its side and after a few convulsive kicks and a few laboured and ineffective respirations, expires. The eyes become prominent, the pupils dilate widely, the corneal reflex is lost and the whole picture resembles an extremely acute asphyxia. A few animals apparently recover from the initial shock and die later.

"Post Mortem Findings.

In animals injected with 0.25, 0.2 and 0.15 milligramme per kilogram there was clotting in both sides of the heart, in the inferior *vena cava* and in the portal vein. In those which received smaller doses, clotting in the portal venous system was invariable, as also was a stringy "whipped out" clot in the heart on the right side in both ventricle and auricle. Clots were frequently noted also in the pulmonary vessels. Clotting in the inferior *vena cava* occurred in only two or three of these animals.

The Effect of Subcutaneous Injection in Rabbits.

A number of domestic rabbits received varying doses under the skin of the abdominal wall. The venom was used in a concentration of five milligrammes per cubic centimetre. The results are set out in Table IV.

TABLE IV.
Results of Subcutaneous Injection in Rabbits.

Number of Animals.	Average Weight in Kilograms.	Dose in Milligrammes per Kilogram.	Result.
6	1.36	2.0	One died in two and a half hours, one in less than sixteen hours, two in less than twenty hours, one in less than forty-eight hours, and one survived.
10	1.38	1.8	One died in five hours, two in less than fifteen hours, one in less than sixteen hours, two in less than twenty-one hours, and four survived.
4	1.38	1.6	One died in less than fifteen hours and three survived.
2	1.4	1.4	One died in less than twenty-one hours and one survived.
2	1.63	1.2	Both survived without symptoms.
2	1.9	1.0	Both survived without symptoms.

The results were complicated by the fact that two or three of the rabbits which survived, appeared to have eaten out the skin in the region of the injection

and so disposed of the poison. The certainly lethal dose is somewhat more than 2.0 milligrammes per kilogram. The "subcutaneous intravenous index" for this species is about 20.

The Symptoms.

The animal which died in two and a half hours, exhibited no obvious symptoms till shortly before death. There was then a very definite loss of tone in the muscles, particularly in those of the neck. There were a few "starting movements" shortly before death. After sitting quietly with the head down and the hind quarters raised, the animal suddenly fell over on one side and died by failure of respiration without convulsions. This animal exhibited typically the neurotoxic action of the venom. Other animals which survived longer, had quite different symptoms. In them the effect of the venom on the lungs causing intense hæmorrhage and congestive œdema, appeared to play the dominant rôle in causing death. In a few of these there was hæmoglobinuria, though this was not so common a symptom in the rabbit as in the cat and rat. These animals a few hours after the injection became dyspnoic and the snout was wet, either from excessive secretion from the respiratory passages or from salivation. In one or two animals there was cough. In some there were weakness and loss of tone in the skeletal muscles and in some death followed from respiratory failure.

Post Mortem Findings.

In the animal which died quickly, there were no gross pathological changes. The blood was fluid in the heart and great vessels and its clotting time was somewhat delayed (thirteen minutes). All the other animals which died, had extensive hæmorrhages and œdema in the lungs. The kidneys were not congested and only in two was there hæmoglobinuria or obvious blood in the urine. There was no *ante mortem* clotting in the heart or great vessels and the blood remained fluid in the veins for some hours after death. In some the intestines contained much bile-stained mucus and the gall bladder was distended with bile. In a few animals the spleen was very black. Patchy petechial hæmorrhages were noted in various organs other than the lungs. There were frequently hæmorrhages in the thymus and occasionally in the mesentery and the heart. The site of injection was œdematous and sometimes the œdema was stained with blood pigment.

THE EFFECTS IN THE GUINEA-PIG.

The Effects of Intravenous Injection.

A few guinea-pigs received the venom intravenously in a concentration of 0.2 milligramme per cubic centimetre, the venom being injected into the jugular vein exposed under local anæsthesia. The results are summarized in Table V.

The certainly lethal intravenous dose for guinea-pigs of this weight is about 0.04 milligramme per 100 grammes.

TABLE V.

Results of Intravenous Injection in Guinea-pigs.

Number of Animals.	Weight or Average Weight in Grammes.	Dose in Milligrammes per 100 Grammes.	Result.
1	230	0.5	Died in seven minutes.
1	228	0.2	Died in seventeen minutes.
1	220	0.1	Died in thirteen minutes.
4	238	0.08	Died in thirty-five, forty-one, fifty-nine and eighty minutes.
4	266	0.06	One died in one hour ten minutes, one in one hour twenty minutes and two in less than fifteen hours.
4	278	0.04	One died in twelve minutes, one in one hour fifteen minutes and two in less than fifteen hours.
4	233	0.03	One died in one hour thirteen minutes and three survived.
4	242	0.02	All survived without symptoms.

The Symptoms.

The symptoms following the larger doses were typical of rapid intravascular coagulation. Doses of 0.5, 0.2 and 0.1 milligramme per 100 grammes caused immediate collapse with feeble locomotor movements, rapid loss of the corneal reflex and death. Following smaller doses there was sometimes, but not invariably, a period of shock commencing two or three minutes after the injection and ushered in by a short period of excitement. The animal made two or three quick runs and then fell over on its side. The corneal reflex was sometimes lost and the respirations became ineffective and gasping. After four or five minutes or somewhat longer, recovery from this collapsed condition took place, death occurring later from respiratory failure with convulsions.

Post Mortem Findings.

Animals which received the larger doses, showed clotting in the heart, in the portal veins and in the inferior vena cava. In animals which died after half an hour or longer, evidence of clotting was by no means invariably obtained. The blood was fluid and its clotting time was much delayed, sometimes more than an hour. There were hæmorrhages in the lungs and staining of the peritoneal membrane and interior of the large vessels. Intense hæmoglobinuria was frequent.

The Effects of Subcutaneous Injection.

For large animals weighing about 600 grammes the certainly lethal dose of this venom appears to be about 0.1 milligramme per 100 grammes. The certainly lethal dose for animals of smaller body weight was somewhat greater than this. The venom injected under the skin of the abdominal wall in a concentration of 0.5 milligramme per cubic centimetre gave the results set out in Table VI.

Though the numbers are somewhat small for this purpose the "characteristic" for this species has been graphed from these results (Figure I). The certainly lethal subcutaneous dose for animals of this weight is 0.14 milligramme per 100 grammes and the "subcutaneous intravenous index" is 3.5.

TABLE VI.

Results of Subcutaneous Injection in Guinea-pigs.

Number of Animals.	Weight or Average Weight in Grammes.	Dose in Milligrammes per 100 Grammes.	Result.
10	250	0.16	Two died in three and half hours, six in less than sixteen hours and two in less than eighteen hours.
10	263	0.14	One died in two and three-quarter hours, two in three and a half hours, one in four hours, one in four and a half hours and five in less than eighteen hours.
20	281	0.12	Two died in nine hours, four in less than fifteen hours, five in less than twenty hours, two on the second day and seven survived.
10	286	0.10	One died in five hours, one in nine hours, two in less than sixteen hours, three in less than twenty hours and twelve survived.
10	289	0.09	One died in nine hours, two in less than twenty hours, one on the third day and six survived.
10	314	0.07	No symptoms, except local swelling; all survived.

The Symptoms.

The symptoms exhibited by guinea-pigs with this range of dosage are predominantly respiratory, the wet nose, dyspnoea and cough being the most frequent symptoms. Anorexia and ruffling of the coat are met with in animals which recover, and are the first symptoms exhibited by those which have received a lethal dose. In these animals there are frequently neurotoxic symptoms. There are general weakness and lowering of the reflex activity of the spinal cord, paralysis of the limbs and general loss of tone of the skeletal musculature. Death usually takes place by failure of respiration.

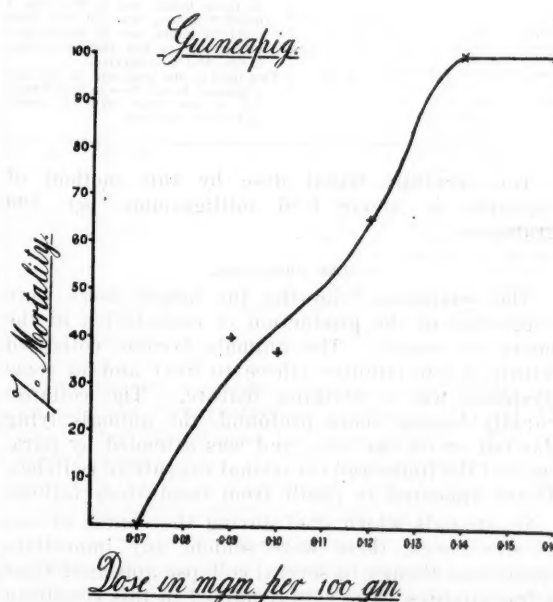


FIGURE I.

Characteristic of the venom of the black snake injected subcutaneously into guinea-pigs.

Post Mortem Findings.

The *post mortem* changes are closely similar to those observed in other species. Hæmorrhages in the lungs and extensive hæmorrhagic œdema at the site of injection are invariable findings. The adrenals are sometimes congested and occasionally even hæmorrhagic. There is increase of bile-stained mucus in the small intestine and rarely hæmorrhage within the lumen. The blood is fluid and coagulation is delayed somewhat (seven and a half, twelve and a half and fifteen minutes). Hæmoglobinuria is infrequent.

EFFECTS IN THE RAT.

The Effect of Intravenous Injection.

A few rats of the same breed as those used in testing the other Australian venoms received injections in one of the lateral veins of the tail. The venom was used in a concentration of 0.2 milligramme per cubic centimetre. The results are set out in Table VII.

TABLE VII.
Results of Intravenous Injection in Rats.

Number of Animals.	Weight or Average Weight in Grammes.	Dose in Milligrammes per 100 Grammes.	Result.
1	152	0.2	Died in twenty-five minutes.
1	190	0.15	Died in fifteen minutes.
1	134	0.12	Died in less than one hour.
5	168	0.06	One died in eleven and a half minutes, one in one and a half hours, one in between one and a half hours and two and a half hours, one in two and a half hours and one in less than fourteen hours.
9	100	0.04	One died in three-quarter hour, one in one and a half hours, one in three hours, one in five and a quarter hours, one in less than eighteen hours, one in twenty-five hours, one in less than forty-two hours, and two survived.
9	157	0.03	Two died in one hour, one in two and a quarter hours, two in four hours, one in less than eighteen hours, and three survived.

The certainly lethal dose by this method of injection is about 0.06 milligramme per 100 grammes.

The Symptoms.

The symptoms following the larger doses were suggestive of the production of coagulation in the heart or vessels. The animals became collapsed within a few minutes (three to five) and in some dyspnoea was a striking feature. The collapse rapidly became more profound, the animals lying flat out or on one side, and was attended by paralysis of the limbs and occasional convulsive twitches. Death appeared to result from respiratory failure.

In animals which died during the course of one to five hours, there were seldom any immediate symptoms, though in several collapse appeared after a few minutes. The rats remained in this condition for some time with definite paresis of the limbs and hæmoglobinuria of varying degrees of intensity. In a few animals convulsive twitches or frank con-

vulsions occurred before death. All the animals which survived these doses, had symptoms of greater or less severity. Hæmoglobinuria was almost invariable. For some hours they ceased to eat, their coats were staring and they sat "hunched up" instead of moving actively about. They had completely recovered in twenty-four hours save a few in which hæmoglobinuria was still present.

Post Mortem Findings.

In a few of the animals which died rapidly, *ante mortem* clots were found in the heart, but in most of the rats the blood appeared to be fluid at autopsy. The kidneys were intensely congested and the bladder contained blood-stained urine. Hæmorrhages in the lungs were invariable and occasionally there were hæmorrhages in the thyroid also. The hæmorrhages in the lungs may have been due to thrombosis in the pulmonary vessels. In a few the spleen was congested. It was difficult to be certain that the portal and mesenteric veins were free from clots, but in one or two animals a hæmorrhagic condition of the small bowel suggested that thrombosis had occurred.

The Effects of Subcutaneous Injection.

For this purpose the venom was used in a concentration of 1.0 milligramme per cubic centimetre and injected under the skin of the flank. The results of injection of a number of animals are set out in Table VIII.

TABLE VIII.
Results of Subcutaneous Injection in Rats.

Number of Animals.	Weight or Average Weight in Grammes.	Dose in Milligrammes per 100 Grammes.	Result.
4	175	0.4	One died in two hours, one in two hours twenty minutes, one in two hours fifty-five minutes and one in three hours ten minutes.
4	191	0.25	One died in two hours forty minutes, one in two hours fifty minutes and two in less than twenty-one hours.
9	160	0.2	Four died in seven hours and the remainder in less than seventeen hours.
10	183	0.15	Six died in less than sixteen hours, one in twenty-two hours, one in twenty-four hours, one in forty hours, and one survived.
16	173	0.12	Four died in less than fifteen hours, one in twenty-three hours, one in twenty-seven hours, one on the third day, and nine survived.
15	168	0.1	One died in twenty hours, one on the third day, and the remainder survived.

The numbers are too small to plot the "characteristic" of the venom for this species. The certainly lethal dose is about 0.2 milligramme per 100 grammes. The "subcutaneous intravenous index" for this species is about 3.

The Symptoms.

With the range of doses studied, the most striking symptoms in this species were salivation, dyspnoea and hæmoglobinuria. In some of the animals which died within a few hours, there were

"starting movements" and weakness, but paralysis was of rare occurrence. Most of the animals which died rapidly, had wet noses and very obvious dyspnoea. Death in most of these occurred following failure of respiration and terminal convulsions were not infrequent. In the animals which died later, a "hunched up" appearance with a staring coat and hæmoglobinuria of varying severity were constant features. Paralysis was rare. In those rats which survived, these symptoms were also present twenty-four hours after the injection, but recovery was complete by the end of the second day.

Post Mortem Findings.

On post mortem examination there was blood-stained œdema at the site of the injection. The lungs were œdematous with areas of hæmorrhage of variable extent. The kidneys were congested and in some intensely blood stained and the urine in the bladder contained fresh or altered blood pigment. The small intestine frequently contained excess of bile-stained mucus. In one or two animals the spleen was enlarged and almost black and in two there was hæmorrhage into the lumen of the bowel associated with thrombosis of the mesenteric vessels.

EFFECTS IN THE MOUSE.

The mice used in these experiments were of mixed breed. Some were albinos, some black and some parti-coloured. They were of the same strains as those used for testing the other Australian venoms. For convenience lighter coloured mice were used for intravenous tests.

The Effects of Intravenous Injection.

The venom in a concentration of 0.05 milligramme per cubic centimetre was injected into one of the lateral veins of the tail in each of a series of mice with the results shown in Table IX. Some of the larger doses were given in a concentration of 0.5 milligramme per cubic centimetre.

TABLE IX.
Results of Intravenous Injection in Mice.

Number of Animals.	Weight or Average Weight in Grammes.	Dose in Milligrammes per 20 Grammes.	Result.
2	20	0.08	Died in nine and ten minutes.
2	25	0.04	Died in seventeen minutes and in one hour forty-three minutes.
2	20	0.03	Died in three and four minutes.
6	21	0.014	Two died in four hours, three in less than six and a half hours and one in less than fifteen hours.
8	19	0.012	One died in three hours, one in three hours twenty-three minutes, two in three hours forty minutes, one in nine hours, and three survived.
8	20	0.01	One died in ten minutes, one in four hours, one in four and a quarter hours, two in eight and a half hours, and three survived.
8	19	0.008	One died in nine hours, one in less than twenty hours, and six survived.
8	20	0.006	All survived without obvious symptoms.

The certainly lethal dose is about 0.014 milligramme per 20 grammes when administered intravenously.

The Symptoms.

With the larger doses the symptoms are typically those produced by sudden intravascular coagulation. The injection is followed very shortly by collapse with a few convulsive movements and death within a few minutes. With dosage of the order of the certainly lethal dose, there are as a rule no immediate symptoms. After a variable time the animals become somewhat collapsed. They move with difficulty, dragging their hind limbs. The coat is ruffled and there is some dyspnoea. The collapse increases and ultimately death takes place, apparently by respiratory failure. Hæmoglobinuria is a common symptom in these less acute illnesses.

Post Mortem Findings.

In the animals which die quickly, clots are found in the heart and larger vessels, but evidence of intravascular clotting could not be found in the majority of the animals dying in from one to twenty hours and the blood appeared to be fluid. Hæmorrhages in the lungs were constantly found and in about half the animals which died, the urine in the bladder contained much blood pigment.

The Effects of Subcutaneous Injection.

The venom was injected under the skin of the flank in a concentration of 0.1 milligramme per cubic centimetre. The results are set out in Table X.

TABLE X.
Results of Subcutaneous Injection in Mice.

Number of Animals.	Weight or Average Weight in Grammes.	Dose in Milligrammes per 20 Grammes.	Result.
8	15	0.07	One died in two hours ten minutes, one in two hours forty minutes, one in three hours forty minutes, one in four hours, two in five hours and two in less than eighteen hours.
20	20	0.06	Four died in two and a half hours, seven died in three hours, two in three and a half hours, one in four hours, four in less than seventeen hours, and two survived.
20	20	0.05	Two died in two and a half hours, nine in three hours, one in four hours, one in less than eighteen hours, one in twenty hours, one on the third day, and five survived.
13	22	0.04	Two died in two and a half hours, one in three and a half hours, two in five hours, one in six and a half hours, and seven survived.
10	20	0.03	Three died in less than twenty-one hours and seven survived.
20	20	0.025	Two died in less than twenty-one hours and eighteen survived.
16	20	0.02	All survived.

Though the numbers of animals are hardly sufficient, the "characteristic" (Figure II) of the venom for this species has been plotted. The certainly lethal dose is 0.07 milligramme per 20 grammes or 3.5 milligrammes per kilogram. The "subcutaneous-intravenous index" is 5.

The Symptoms.

The symptoms observed with this range of dosage, were predominantly neurotoxic. The animals rapidly exhibited weakness of the hind limbs and general loss of tone. Hæmoglobinuria was almost invariable. Death took place from respiratory failure.

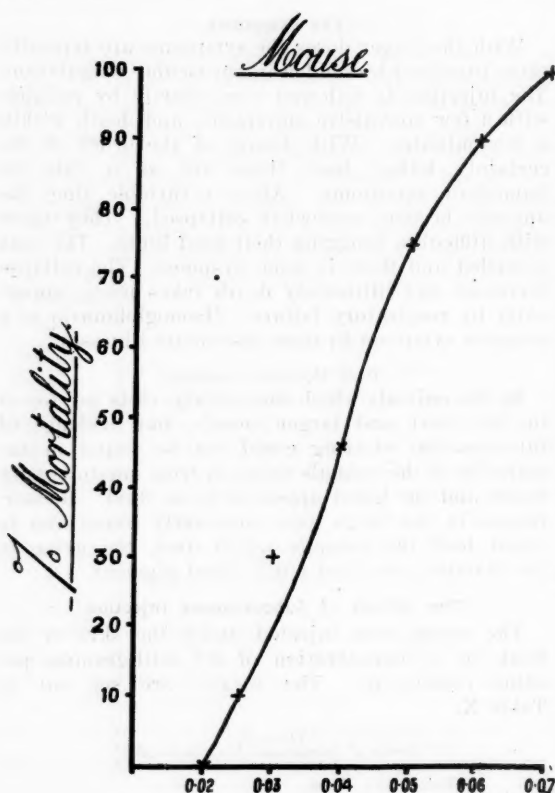


FIGURE 11.
Characteristic of the venom of the black snake injected subcutaneously into mice. The ordinate shows the dose in milligrammes per twenty grammes.

Post Mortem Findings.

The most striking *post mortem* features were the hæmorrhages in the lungs and the hæmoglobinuria. In a few animals the intestine was filled with bile-stained mucus.

DISCUSSION.

It is of some interest to compare the results obtained with this venom with those obtained with the venoms of two other species of the same genus

(*Pseudechis guttatus*) (de Vis) (Kellaway,⁽⁶⁾ 1929) and *Pseudechis australis*. A sample of the venom of the latter snake was obtained by McLennan from a single snake (thought by him to be identical with *Oxyuranus macleynani*). The venom was examined by Kellaway and Williams⁽⁷⁾ in 1929 and was found to resemble those of other snakes of the genus *Pseudechis*, being powerfully hæmolytic, relatively feebly neurotoxic in action and completely different from that of *Oxyuranus macleynani*. It was therefore provisionally described as the venom of *Pseudechis scutellatus* (Peters), a snake which is so closely similar to *Oxyuranus macleynani* as to be difficult to distinguish from it. Mr. Donald Thomson, however, brought back from northern Queensland the actual specimen from which this particular sample of venom had been obtained and has identified it as *Pseudechis australis*, an opinion with which Mr. J. R. Kinghorn who kindly examined the specimen, concurs.

In Table XI are set out for comparison the certainly lethal doses of these three *Pseudechis* venoms. The observations in many of the species are too few in number to give more than an approximate value for the certainly lethal doses and it is hoped later to obtain more accurate figures for the venoms of two less common snakes. In the meanwhile the three venoms are seen to be closely similar both in their action and in the doses necessary to produce lethal effects.

These results are of some general interest. The subcutaneous-intravenous index in the rabbit for *Pseudechis porphyriacus* indicates the more potent coagulant action of the venom of this snake. The venom of *Pseudechis australis* contains no "thrombase" and instead is anti-coagulant. Otherwise the venoms are closely similar in action and the certainly lethal doses are of about the same order for all the species compared.

The observations suggest that the examination of a venom may afford confirmatory evidence of the genus to which a given snake belongs. Certainly the three venoms under consideration resemble each other more closely than any other Australian venom which I have so far examined. Should this relation

TABLE XI.
Comparison of the Certainly Lethal Doses of the Venoms of *Pseudechis porphyriacus*, *Pseudechis guttatus* and *Pseudechis australis*.

Species.	<i>Pseudechis porphyriacus</i> .			<i>Pseudechis guttatus</i> .			<i>Pseudechis australis</i> .		
	Intravenous Certainly Lethal Dose in Milligrammes per Kilogram.	Subcutaneous Certainly Lethal Dose in Milligrammes per Kilogram.	Subcutaneous-Intravenous Index.	Intravenous Certainly Lethal Dose in Milligrammes per Kilogram.	Subcutaneous Certainly Lethal Dose in Milligrammes per Kilogram.	Subcutaneous-Intravenous Index.	Intravenous Certainly Lethal Dose in Milligrammes per Kilogram.	Subcutaneous Certainly Lethal Dose in Milligrammes per Kilogram.	Subcutaneous-Intravenous Index.
Monkey..	—	0.5 to 0.8	—	—	—	—	—	—	—
Cat ..	—	7.0 to 10.0	—	—	—	—	—	—	—
Rabbit ..	0.11	More than 2.0	About 20	About 0.6	About 1	Between 1 and 2	0.7	More than 2.0	About 3
Guinea-pig	0.4	Between 1.2 and 1.6	Between 3 and 4	0.6	0.8	1.3	—	More than 2.0	—
Rat ..	0.6	2.0	3	Between 0.4 and 0.8	0.7	About 1	—	More than 4.0	—
Mouse ..	0.7	3.5	5	About 1.0	2.5	About 2.5	—	—	—

between the venoms of different species in a genus prove of general application, it will afford a reasonable probability in regard to the degree of the toxicity of the venom of snakes infrequently met with.

It will be interesting further to observe, when the opportunity offers, whether the venoms of snakes of the same genus in addition to being pharmacologically similar, both quantitatively and qualitatively, possess common antigenic groupings, thus simplifying the ultimate application of serum therapy.

CONCLUSIONS.

(1) The certainly lethal doses of the venom of the Australian black snake *Pseudechis porphyriacus* has been determined for a number of species both by subcutaneous and intravenous administration and the subcutaneous-intravenous index has been calculated.

(2) Comparison between the effects of the venoms of *Pseudechis porphyriacus*, *Pseudechis guttatus* and *Pseudechis australis* is made and shows that these venoms are closely similar in action and that their certainly lethal doses for different species are all of the same order.

(3) It is suggested that the examination of a venom may afford excellent confirmatory evidence of the genus to which the snake belongs.

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MINERAL CONTENT OF THE DEVELOPING AVIAN EMBRYO.¹

By WINIFRED R. MANKIN, M.Sc.,
Sydney.

MANY statements have been made with regard to the difference in chemical composition of embryonic

and adult tissue. As a number of egg embryos were at the time the most convenient source of embryonic material, it was thought interesting to see how some of the inorganic constituents as well as the water content of these varied during development.

It was not intended to deal with neoplastic tissue here, but as it has sometimes been compared with embryonic tissue, it was thought wise to include in the following typical extracts something of the mineral composition of neoplastic tissue.

Historical Summary.

Murray⁽¹⁾ has found that the chick embryo becomes drier as it becomes older. Thus a five-day embryo contains 5.32% of solid, while a nineteen-day embryo contains 17.44% of solid. He also has found that there is a decrease in the ash (estimated as ash per hundred grammes of dry substance) content of eleven grammes for a ten-day embryo to 8.4 grammes for a twenty-day embryo. There are, however, fluctuations between these two figures (see Table I).

TABLE I.
Content of Embryos in Terms of Age.

Age in Days.	Ash in Grammes per 100 Grammes of Dry Substance.
10	11.0
10	11.1
12	10.5
13	9.8
13	9.6
13	10.8
14	7.9
14	10.2
15	7.4
16	7.5
19	7.8
19	8.3
19	8.3
20	7.7
20	8.4

Jakubowitch⁽²⁾ made a systematic examination of the muscles in the foetal calf. He found that the nearer the foetus approached maturity, the less became the percentage of water and the greater the amount of solid and ash constituents in its muscles.

Baimakoff⁽³⁾ investigated the chemical composition of the muscle of new-born infants and of children up to the age of two years. His results are given in Table II.

TABLE II.

Age.	Water.	Solids.	Albumin.
At birth ..	81.65	18.35	11.28
Three months ..	79.22	20.78	12.22
Two years ..	77.21	22.79	13.05

P. Mendeleef⁽⁴⁾ said that the embryo was foreign to the mother, so that its tissue juices acted like

¹ This work was carried out under the control of the Cancer Research Committee of the University of Sydney and with the aid of the Cancer Research and Treatment Fund.

heterogeneous colloids to those of the mother. Thus, speaking of mammalian embryos, he said that the embryonic tissues were characterized by large fluctuations in electrolytes and a high membranous permeability; the maternal tissues by stability in the content of electrolytes and by low permeability compared with the embryo, though high compared with the normal adult.

Karl Hellmuth⁽⁵⁾ said that under normal conditions the foetal blood obtained from the umbilical cord contained about 4.5% more chlorides than the simultaneously drawn maternal blood. The average phosphate contents in the two sources were 5.33 and 3.51 milligrammes respectively. Potassium, sodium and amino acids were found in larger amounts in foetal blood than in maternal blood.

Ernst Schmitz⁽⁶⁾ stated that minimal traces of calcium oxide were found in fetuses at very early stages. The calcium content of the foetus rose rapidly from the end of the third month onwards. The amounts at the end of the third, fourth, fifth, sixth, seventh, eighth and ninth months were 0.045, 0.35, 1.6, 4.66, 10.44, 16.64 and 28.6 grammes. The daily increase of calcium oxide in the last month was 3.999 grammes. Towards the close of a normal pregnancy the blood of the mother shows only slight changes in calcium content from normal.

A. Lasnitzki⁽⁷⁾ stated that potassium increased the intensity of cell growth and analysis of growing tissues showed an increased potassium content parallel to the intensity of growth activity with which also went a parallel increase in the water content of the cells. Increase in water was dependent on an increase of the hydration of some or all of the cell colloids which depended on the potassium content. Fermentation of glucose to lactic acid was the energy producing action of all cell growth. The fermentative action of the cells in general increased with general increased intensity of growth. The potassium in cells increased fermentative activity. Intensity of reactions which furnished energy for cell growth, was dependent on a specified sort of hydration swelling of certain colloids of the cells, in such a way that it increased with increasing hydration of these colloids within certain limits, provided that all other factors bearing on the energy producing reactions remained constant.

N. Waterman⁽⁸⁾ said that there existed in tumours an antagonism between potassium and calcium in proportion to the rate of degenerative changes.

M. Loeper,⁽⁹⁾ R. Turpin and Zizine said that the potassium of blood was shown to increase with the development of cancer. Authors examined calcium and potassium of normal and castrated mice with grafted mammalian epitheliomata. Castration diminished the potassium content of the mouse's body and following castration the tumour grafts developed abnormally and frequently underwent regression. Likewise the potassium content of

grafts in castrated mice was much smaller than in the controls.

A. H. Roffo⁽¹⁰⁾ and A. Lassere said that the more rapidly growing the tumour the greater the ratio of potassium to calcium.

M. Wolf⁽¹¹⁾ said that a study which was mainly histological, led to the following conclusions. Cancerous tissue presented an exaggerated permeability to calcium and potassium as compared with normal tissue. That calcium and potassium played an important rôle in the pathological mechanism and evolution of cancer was perhaps explained by their antagonism to electronic radiation. Simultaneous accumulation in variable and independent quantities of potassium and calcium controlled the vital rhythm or proliferatory activity of the cancerous tissue. Calcium appeared to be capable of acting efficiently only in its ionic form.

Preparation of Material.

Eggs were obtained from fowls which had been separately and specially penned, so that it was easy to separate the eggs in groups as having been laid by the same fowl (see Table III). These eggs were incubated at about 37° C. for the time specified. Regarding the age of the embryos this can only be given in terms of days of incubation. The absolute age of a chick embryo depends partly on time of incubation and partly on conditions previous to incubation. The usual method of separating the early embryos from extraneous matter was to place the embryo and amniotic sac on a piece of clean filter paper, cut the sac and allow the amniotic fluid to soak away, then by means of forceps place the embryo in a weighed silica dish. The older embryos were lifted out of the shell by forceps; any fluid dripping from the animal was carefully soaked away by clean filter paper. The animal was placed in a weighed silica dish. The material was placed in an air oven and dried at a temperature slightly over 100° C. till its weight was constant. The difference in weight of wet and dry material was taken as water. The material was ashed according to the method described previously by myself.⁽¹⁵⁾ The ash was extracted with five hundred cubic centimetres of distilled water and the extract evaporated and made up to a final volume of one hundred cubic centimetres.

An aliquot portion of this was used for chloride estimation. The rest of the water extract was placed with the previously extracted ash and evaporated nearly to dryness. The whole was then extracted with one hundred cubic centimetres of one half normal hydrochloric acid. Aliquot portions of this were used for the estimation of sodium, potassium and calcium.

Method of Estimating Chloride.

To the aliquot portion of water extract was added a definite volume (usually 10 to 20 cubic centimetres) of one-hundredth normal silver chloride solution and a few drops of chloride-free nitric acid.

TABLE III.

Age of Embryos.	Number of Embryos used for Ashing.	Weight of Embryos, Wet and Dry (Grammes).	Percentage.		Potassium : Milligrammes per Gramme.		Calcium : Milligrammes per Gramme.		Chloride : Milligrammes per Gramme.		Sodium : Milligrammes per Gramme.		Grammes of Water per 100 Grammes Dry Material.
			Solid.	Water.	Wet Tissue.	Dry Tissue.	Wet Tissue.	Dry Tissue.	Wet Tissue.	Dry Tissue.	Wet Tissue.	Dry Tissue.	
4 day embryos mixed	73	10.5126 0.5388 0.0097 0.7616	5.1	94.9	1.5	29.25	0.32	62.8	3.75	73.2	2.83	55.2	1,845
5 day embryos mixed	71	13.0097 0.7616	5.85	94.15	1.87	31.9	0.33	5.64	2.72	46.5	2.65	45.3	1,610
6 day embryos mixed	35	17.8249 1.0263	5.76	94.24	1.65	28.85	0.22	3.84	2.72	47.0	2.51	43.9	1,645
D10 6 day embryos	24	9.1780 0.5133	5.57	94.43	1.84	32.9	0.28	5.0	2.1	37.5			1,695
D17 7 day embryos	5	4.8592 0.2812	6.03	93.97	1.78	29.45	0.22	3.64	3.03	50.2	2.31	38.3	1,560
C12 7 day embryos	16	12.2728 0.7280	5.93	94.07	1.74	29.3	0.12	2.02	2.68	45.2	2.82	47.5	1,586
7 day embryos mixed	27	18.472 1.1137	6.03	93.97				7.32	2.7	44.9			1,560
8 day embryos mixed	15	15.1491 0.9721	6.4	93.6	1.76	27.4	0.244	3.8	1.84	28.7	2.36	36.7	1,462.5
D13 8 day embryos	5	6.1646 0.3836	6.22	93.78	1.69	27.2	0.37	5.94	2.92	46.9	2.65	42.5	1,507.5
9 day embryos mixed		18.7676 1.2599	6.72	93.28	2.1	31.3	0.33	4.92	2.73	40.7	2.55	38.0	1,390
C18 9 day embryos	8	14.85 0.96	6.46	93.54	1.72	26.6	0.2	3.04	2.26	35.0	2.21	34.2	1,450
D11 9 day embryos	5	9.6895 0.6385	6.6	93.4	1.77	26.9	0.47	7.12	2.4	36.4	2.83	43.0	1,416
Px4 10 day embryo	1	3.256 0.2436	7.4	92.6	1.97	26.4	0.44	5.97			2.71	36.2	1,251
C11 10 day embryos	3	8.8034 0.6386	7.26	92.74	1.95	26.9	0.35	4.85	2.0	27.6	2.66	36.8	1,277
C10 11 day embryo	1	3.8326 0.2674	7.0	93.0			0.369	5.27			4.88	70.0	1,330
D14 12 day embryos	2	10.7822 0.7562	7	93.0	1.87	26.6	0.72	10.3	2.83	40.3	2.85	40.6	1,330
C19 12 day embryos	2	12.4972 1.0582	8.5	91.5	2.15	25.6	0.83	9.76	2.23	26.3	2.47	2.92	1,077
D3 13 day embryo..	1	6.06 0.404	6.67	93.33	1.93	29.0	0.91	13.65	2.93	44.0	3.36	50.4	1,400
C9 13 day embryo..	1	5.947 0.5486	9.24	90.76	2.21	23.9	0.7	7.58	2.6	28.2	2.63	28.3	981
C7 14 day embryo..	1	5.35 0.61	11.5	88.5	1.68	14.7	1.25	10.8	4.27	37.4	4.32	37.9	769.0
D2 16 day embryo..	1	8.04 1.63	20.3	79.7	1.8	8.93	2.76	13.6	2.29	11.3	2.42	11.9	392.5
C5 16 day embryo..	1	14.9364 2.6614	17.9	82.1	1.69	9.49	1.83	10.2	1.78	9.98	1.59	8.92	459.0
C2 17 day embryo..	1	18.5472 3.286	17.7	82.3	1.89	10.7	2.1	11.9	1.77	10.0	2.25	12.7	465
C6 17 day embryo..	1	20.5474 3.665	17.8	82.2	1.76	9.87	2.22	12.5	1.83	10.3	1.73	9.72	462
Px2 18 day embryo	1	27.7476 4.7258	17	83.0	1.71	10.05	2.74		1.47	8.64	2.14	12.6	488
C3 18 day embryo..	1	20.7328 3.7016	17.8	82.2	1.91	10.7	2.1	11.7	1.52	8.50	2.24	12.6	463
C8 19 day embryo..	1	22.577 4.3488	19.3	80.7	2.05	10.6	2.73	14.15	2.02	10.5	1.935	10.1	418
D9 19 day embryo..	1	19.253 4.184	21.7	78.3	2.26	10.4	2.19	10.1	1.3	5.98	2.65	12.2	360
C1 20 day embryo..	1	31.8346 7.2396	22.8	77.2	1.99	8.74	2.25	9.85	1.3	5.7	1.815	7.98	338
D1 20 day embryo..	1	25.607 6.889	25	75.0	2.2	8.83	3.95	15.8	1.27	5.1	1.93	7.75	300
D4 20 day embryo..	1	39.3506 9.6846	24.6	75.4	1.76	7.16	3.27	13.3			1.69	6.86	306.5
D5 20 day embryo..	1	37.763 9.6814	25.6	74.4	1.72	6.7	3.47	13.5	1.86	7.24	1.67	6.5	290.5
D6 20 day embryo..	1	39.2702 9.8162	25	75	1.78	7.12	2.91	11.6	1.38	5.5	2.01	8.04	300
D8 20 day embryo..	1	22.8794 4.4924	19.7	80.3	1.94	9.88	2.65	13.4	1.53	7.8	1.82	9.28	407
B1 20 day embryo..	1	36.726 10.566	28.7	71.3	1.94	6.74	3.43	11.9	1.13	3.93	1.84	6.4	248.5
D7 full time ..	1	34.45 9.1435	26.12	73.88	1.75	6.6	3.35	12.8			2.1	7.9	283
C13 helped out of shell	1	32.3380 8.78	27.2	72.8					1.29	4.75			267.5
C14 full time ..	1	31.07 9.8831	31.8	68.2	2.1	6.6	3.81	12.1	1.06	3.33	2.34	7.36	214.5

The whole was allowed to stand in boiling water in a bath till the precipitate had coagulated and the solution had evaporated to a volume of something less than five cubic centimetres. This, when cold, was titrated with one-hundredth normal ammonium thiocyanate, ferric alum being used as indicator.

Method for Estimating Potassium.

An aliquot portion of the hydrochloric acid extract was placed in a "Pyrex" centrifuge

tube and evaporated to dryness. The residue was taken up with one cubic centimetre of hot distilled water. When this solution became cold, two cubic centimetres of precipitating reagent made up according to the method of Clausen were added. The whole was allowed to stand two hours at room temperature. It was then centrifuged and the supernatant fluid was removed from the yellow precipitate of potassium-sodium-cobaltinitrite by means of a fine glass tube attached to a suction pump. The

precipitate was washed twice with distilled water which had previously been saturated with the above precipitate.

The precipitate was then titrated with excess potassium permanganate in the presence of a few drops of 10% sulphuric acid. An excess of one-hundredth normal oxalic acid was added and the solution titrated back with one-hundredth normal permanganate of potash. The volume of permanganate necessary to titrate a "blank" experiment is subtracted from the number of cubic centimetres used in the above experiment. The result was calculated on the fact that each cubic centimetre of one-hundredth normal potassium permanganate equals 0.071 milligramme of potassium.

It was found that in order to obtain consistent results it was best to use freshly prepared reagent, that is reagent which had been prepared on the previous day.

Determination of Sodium.

The method used in the determination of sodium was a modification of the one used by Barrenscheen and Messiner and later by Poulsson. An aliquot portion of the hydrochloric extract was evaporated to dryness in a graduated fifteen cubic centimetre "Pyrex" centrifuge tube. A volume containing about 0.2 milligramme of sodium was found to be a convenient amount with which to work. The residue was taken up with one cubic centimetre of hot distilled water, then cooled. To this solution was added four cubic centimetres of a saturated solution of zinc acetate in 60% alcohol; after mixing the contents well with a thin glass rod the tube was immersed in a water bath at about 60° C. for two minutes, cooled and then sufficient water and alcohol were mixed with the contents to make a total volume of gas containing 50% alcohol. This mixture was centrifuged, the exact final volume having been noted, four cubic centimetres of the filtrate (now phosphate free) were pipetted into another "Pyrex" tube and to this were added two cubic centimetres of reagent (prepared according to Barrenscheen and Messiner) and two cubic centimetres of 95% alcohol. This was well mixed with a thin glass stirring rod and after having stood two hours was centrifuged. The precipitate was washed twice with a saturated solution of this precipitate in 95% alcohol. The technique for removing supernatant fluid was the same as that described in the estimation of potassium. After the final washing the precipitate was dissolved in one cubic centimetre of 10% acetic acid, transferred by means of distilled water to a graduated flask (fifty or one hundred cubic centimetres). On the addition of one cubic centimetre of 20% potassium ferrocyanide *plus* sufficient water to complete the volume to fifty or one hundred cubic centimetres, an intense brown coloration was developed. This colour was compared by means of a colorimeter to the colour produced by a known amount of sodium (sodium chloride solution) which, except for phosphate precipitation, was prepared in exactly the

same manner as the unknown. Care was taken so that in the final stage of the experiment the concentration of acetic acid and potassium ferrocyanide was the same in the standard as in the unknown.

Accuracy of Method for Estimating Calcium.

The method for the estimation of calcium and the accuracy of the method have been described elsewhere.⁽¹⁵⁾

Accuracy of Method for Estimating Potassium.

A solution was made up containing potassium, sodium and calcium as chlorides. An estimation of potassium was done on a volume of this solution containing 0.2 milligramme of potassium.

Potassium found by experiment was 0.1995, 0.1995, 0.1995. Estimation on half the above volume of solution gave the following result: 0.0951, 0.0937.

Recovery of added potassium: A sample of egg yolk was well mixed and divided into two portions. (a) 7.12 grammes of it were ashed by same method as used in analysis of embryos.

(b) 6.39 grammes of it *plus* a solution containing 10 milligrammes each of sodium, potassium and calcium were ashed under the same conditions.

Estimation of potassium on (a) gave result as 1.07 milligrammes per gramme and on (b) 2.70 milligrammes per gramme.

Potassium added to (b) = $10/6.39 = 1.57$ milligrammes per gramme.

Potassium recovered in (a) by difference = $2.70 - 1.57 = 1.13$ milligrammes per gramme.

To determine whether hot distilled water was able to extract all the potassium present in an ash, 38.038 grammes of muscle and embryo tissue were dried to a constant weight of 9.471 grammes. This was powdered in a mortar and divided in the following way.

Dish.	Weight of Material.
A	10.20 grammes
67	8.99 grammes
Z	9.08 grammes
66	8.02 grammes

Each of these was ashed under the same conditions. A and 67 were extracted with five hundred cubic centimetres of hot distilled water. Z and 66 were extracted with one hundred cubic centimetres of hot half normal hydrochloric acid.

Estimations of potassium on the above gave the following results:

A	4.340 milligrammes per gramme.
67	4.300 milligrammes per gramme.
Z	4.680 milligrammes per gramme.
66	4.735 milligrammes per gramme.

X (1) and X (2) were samples of egg white ashed under the same conditions. X (1) was 15.1205 grammes of white which was extracted with hot distilled water. X (2) was 10.0434 grammes of white which was extracted with hot half normal hydrochloric acid. The following are the results of estimations of potassium on the above. X (1), 1.42 milligrammes per gramme; X (2), 1.57 milligrammes per gramme. From these figures it was

possible to work out a factor which allowed for the quantity of potassium which was lost from the embryo ashes due to an aliquot portion of the water extract being used for chloride estimation.

To determine purity of reagents blank experiments were performed. By a blank experiment in this case is meant an estimation of potassium carried out on one cubic centimetre of distilled water, using the same quantity of reagent as used in experiments on ash extracts. It was usually found that there was present in such a volume of reagent 0.0071 milligramme of potassium.

Accuracy of Sodium Method.

In order to determine (i) the accuracy of duplicate experiments on the same material, (ii) the recovery of sodium added to material before ashing, (iii) whether hot distilled water removed all the sodium from an ash as efficiently as hot half normal hydrochloric acid, the following experiment was performed. A quantity of egg white was thoroughly mixed and then divided up as follows:

Dish.	Weight of Material.
7	32.080 grammes
2	29.777 grammes
X	27.055 grammes
47	23.400 grammes
66	30.576 grammes
5	26.582 grammes

To X were added fifteen cubic centimetres of a solution containing 1.296 milligrammes of sodium per cubic centimetre. The contents of each of these dishes was dried and ashed under the same con-

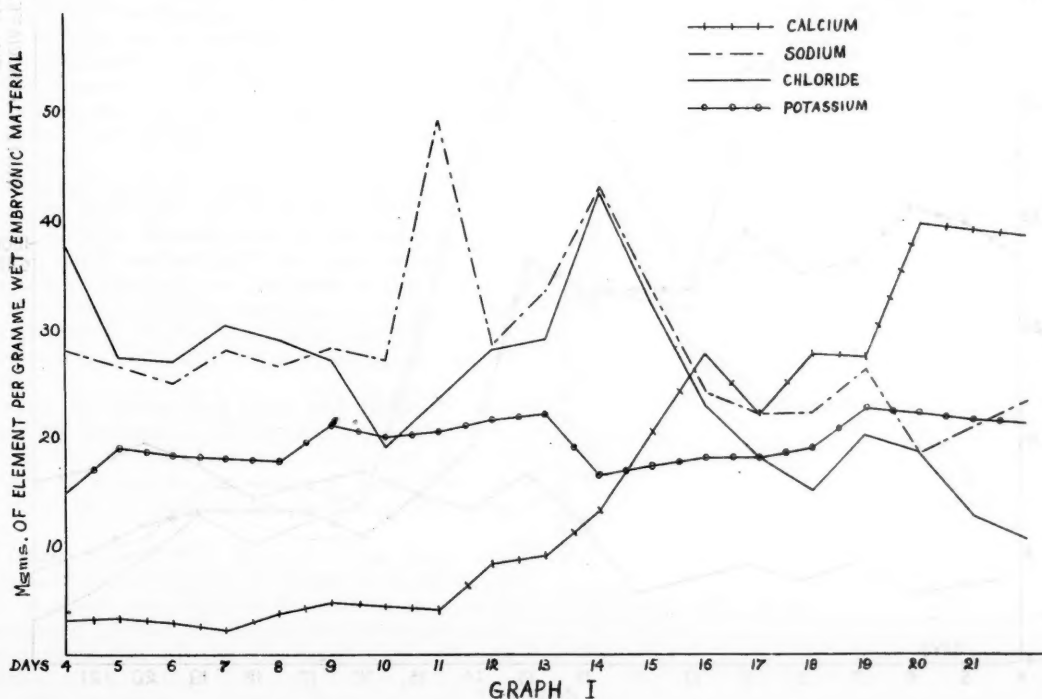
ditions as embryo experiments. The contents of 7, 2 and X were extracted with one hundred cubic centimetres of half normal hydrochloric acid. The other ashes were extracted with about five hundred cubic centimetres of hot distilled water. The following are the results of a series of sodium determinations done on aliquot portions of each of the above extracts.

Dish.	Milligrammes per Gramme.	Average.
7	1.680 1.660 1.695	1.68
2	1.610	
X	2.340 2.300	2.32
47	1.595 1.570	1.58
66	1.610 1.640	1.64
5	1.680 1.610 1.640	1.63

Averaging the figures, 1.61 milligrammes per gramme and 1.68 milligrammes per gramme, obtained by the analysis of the acid extract, we obtain the figure 1.65 milligrammes per gramme.

Averaging the figures, 1.58, 1.63, 1.64, obtained by the analysis of the water extract of the material, we obtain the figure 1.62. Apparently hot distilled water is an efficient solvent for the sodium salts present in the ashes examined.

Regarding recovery of added sodium, 0.718 milligramme per gramme of sodium was added to material X. Sodium calculated as added, 2.32 - 1.65



= 0.67 milligramme per gramme which agrees satisfactorily with the actual amount added.

Estimations of sodium on a solution containing potassium chloride and calcium chloride besides sodium chloride were satisfactory.

It was thought that extraneous sodium could occur in either or all of three places: (i) reagents, (ii) the hydrochloric acid used for extraction of the ashes, (iii) the glass in the bottles which were used to store the ash solutions. In order to estimate the sodium likely to be added from such sources blank experiments were performed. The average amount of sodium found in four cubic centimetres of absolute alcohol and zinc acetate was 0.0127 milligramme. About one hundred cubic centimetres of half normal hydrochloric acid were allowed to stand in a glass bottle for approximately six months. An estimation of sodium done on this revealed the

fact that one cubic centimetre of this acid contained 0.0112 milligramme of sodium. This figure would account for the sodium already present in the hydrochloric acid as well as that dissolved from the glass.

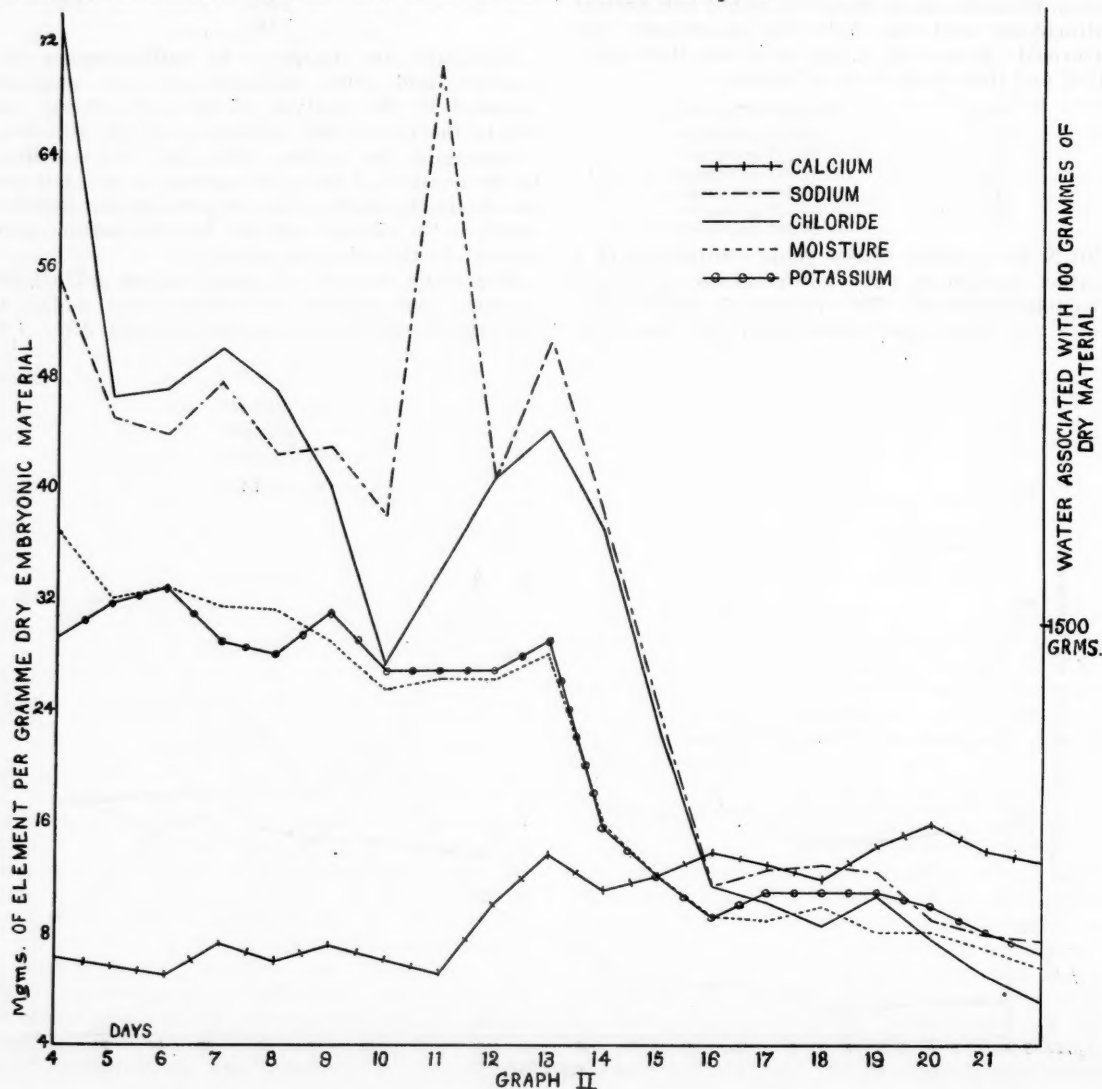
These figures were taken into account when working out results.

Discussion.

Three hundred and fourteen chick embryos, developed in eggs laid by four fowls and varying in age from four days to hatched chicks, have been examined with regard to their water, potassium, sodium, chloride and calcium content.

Table III shows the results obtained by the above determinations.

Graph I shows the composition of the wet tissue. Graph II was drawn to eliminate the varying water factor in Graph I.



On examination of the results it is found that a four-day embryo contains 5.12% of solid and a twenty-day embryo about 23% of solid. Compare these figures with those already referred to and obtained by Murray (see Table IV).

TABLE IV.

Age of Embryo in Days.	Solid Percentage.
5	5.32
6	5.58
7	5.85
8	6.21
9	6.50
10	7.00
11	7.70
12	8.80
13	10.10
14	12.25
15	14.60
16	16.40
17	17.22
18	17.69
19	17.70

It is also seen most plainly from Graph II that the sodium chloride and potassium content of the four-day embryo is considerably higher than that of the fully developed chick. (I should like to refer again to Table I, showing Murray's figures containing the ash content of dry chick embryo.)

The calcium content, however, is greater in the fully developed chick than in the early embryo. This would be expected as there has been considerable deposition of calcium during bone formation. A summary of most of the work done with regard to the origin of the calcium contained in the embryo will be found in my previous paper.⁽¹⁵⁾

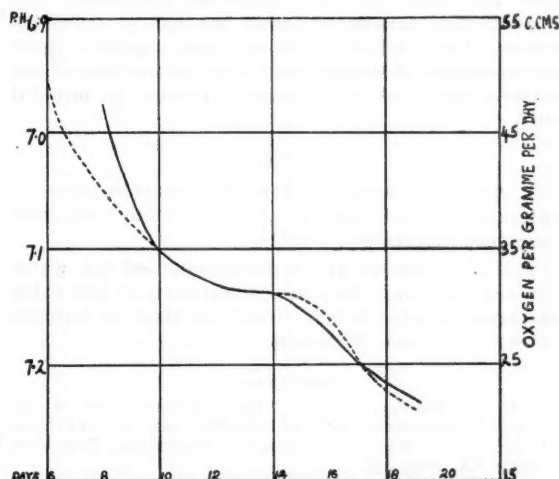
The higher percentage of water contained in the early embryo may be necessary to dilute the extra salt to isotonicity with blood. As we have no information concerning the percentage of atoms which are in ionic form, we have insufficient data on which to make a calculation in order to verify the above assumption.

Referring again to Graph II, it is noted that on about the thirteenth day there is a slight increase in the calcium concentration of the embryo, while there is a very marked fall in the other constituents. A search was made in the literature available to see whether this could be correlated with any other marked change in the life of the embryo, such as differentiation of structure or change of rate of growth.

Graph III shows that Cohn and Mirsky⁽¹²⁾ find a decided decrease in the hydrogen ion concentration of the arterial (reduced) blood and Murray finds a decrease in the rate of metabolism as measured by the oxygen consumption on about this date.

Further (Graph IV), Murray⁽¹³⁾ has found that the rate of growth rapidly decreases from about five days to about nine days where there is apparently a quiescent period till about the thirteenth day, then a rapid fall till the nineteenth day, and, one assumes, till hatching. Referring to Graph II, it is seen that, excepting calcium, there is a general

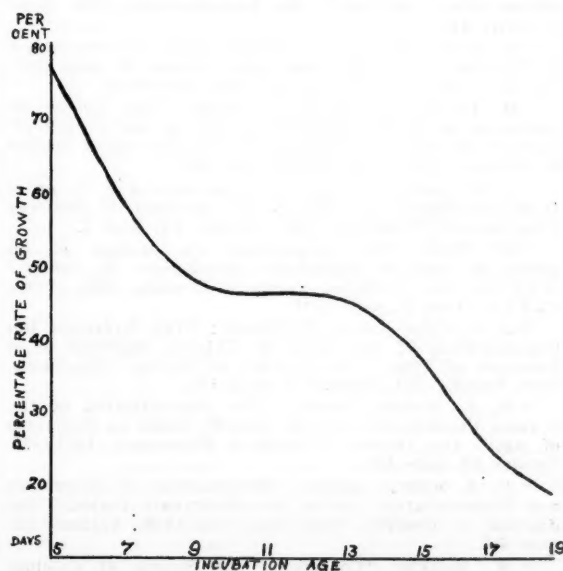
decrease in the mineral constituents till about the tenth day, from then till the thirteenth day there is a general rise and on the thirteenth day a most marked general fall.



GRAPH III.

A curve is shown (the solid line) indicating the course of the change in hydrogen ion concentration in the arterial (reduced) blood of chicken embryos. In the middle of the curve corresponding to the period between ten and fourteen days, there is a flattening of the curve. A curve (dotted line) published by Murray showing alterations with time of oxygen consumption, flattens at the same period; the ends of the two curves follow similar courses.

Another interesting point brought out by this graph is that the water content of the developing avian embryo runs very closely parallel to the potassium content. In this connexion I should again like to quote A. Lasnitzki, who said that analysis of growing tissues showed an increased potassium



GRAPH IV.

content parallel to the intensity of growth activity with which also went a parallel increase in the water content of the cells.

Concerning the ratio of potassium to calcium in growing tissue one can make no statement. It appears that this decreases as the embryo develops, but as stated before, from the data available there are no means of determining what proportion of the mineral constituents is actually present as mineral salts.

Summary.

1. Accurate methods for the determination of calcium, chloride, sodium and potassium have been described or referred to here.

2. The results of the determination of the water content and above mineral constituents of 314 chick embryos, ranging in age from four days to hatched chicks, have been indicated.

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ACUTE MASTOIDITIS.

By ATHOL BLAUBAUM, M.B., B.S. (Melbourne), F.C.S.A.,
Honorary Surgeon, Ear, Nose and Throat Department,
The Alfred Hospital, Melbourne.

It may be taken for granted that acute mastoid disease is always secondary to an infection spreading from the middle ear. Those rare cases of mastoiditis rising from an infection *viâ* the blood stream are not of much clinical importance.

Now every case of acute purulent otitis must of necessity be accompanied by an accumulation of pus in the mastoid antrum, *plus* an infection of the mucosa of that cavity. If the drainage through the tympanic membrane due to spontaneous rupture or incision is sufficiently good, then the condition resolves and the aural discharge soon ceases with healing of the perforation. If, on the other hand, the mucosa of the mastoid antrum does not prove a sufficient barrier to the infection, the bone becomes involved and mastoiditis is present.

It is now necessary to bear in mind that there are three types of mastoid bone.

The first type is the acellular. Here practically the only cell present is the mastoid antrum, the rest of the mastoid being a solid, often ivory hard bone, the antrum being on an average three-quarters of an inch from the surface, so that if the infection does not quickly clear up, we are left with a chronic suppurative otitis or chronic mastoiditis, as we prefer to call it. It is also here that you may easily get intracranial complications.

The second type of bone is the diploic and the third type the cellular. Both these types may be considered together, as the one often merges into the other. The mastoid cortex is thin and when chipped off exposes the cellular structure which may extend forwards into the zygoma, backwards into the occipital bone and downwards to the mastoid tip, where there is often quite a large cell.

Obviously the infection, once attacking the bony walls of the mastoid antrum, can quickly spread from one cell to another until the whole mastoid is badly involved, the cells with their mucosa swollen and oedematous, bathed in pus and the trabeculae breaking down as they are attacked. Soon the cortex is involved and if untreated, the condition presents with a subperiosteal abscess, oedema behind, above or below or in front of the ear, according to where the pus burrows, with erection of the auricle and so the classical signs of the text book.

In dealing with a case of acute otitis, one naturally is always on the lookout for signs of mastoid involvement and if one waits until the above classical signs are present, one will often be faced with a necessity of not only having to deal with the mastoiditis, but also with some much more dangerous complications.

In acute suppurative otitis one should always incise the tympanic membrane early and make sure that the incision is a wide one and not merely a stab.

If perforation has occurred and there is still pain, enlarge the incision. After a couple of days' free discharge and if the patient is doing well, the temperature and pulse will be down, the discharge getting less and the hearing improving. It is well now to dry out the meatus and have a careful look at the membrane. It should be beginning to show up well. The hyperæmia will be disappearing and the patient quite comfortable, there being no pain or mastoid tenderness, and the condition will go on to cure.

If, on the other hand, in spite of the free opening in the membrane, the free discharge of pus, the patient is beginning to feel a distinct fullness in the ear and is aware of a continuous pulsation deep in the meatus and there is some tenderness on deep pressure over the mastoid antrum or tip of the bone, mastoiditis is present.

The temperature will often be found normal, though there is usually a rise in the evening, with a corresponding rise of the pulse rate, but the temperature never rises very high in uncomplicated mastoiditis.

Now the examination of the ear will disclose a good deal of swelling deep in the meatus, the membrane will not show up. There is a profuse discharge which, when wiped away, quickly accumulates and can be seen pulsating where the perforation is. There can usually be seen a bulging of the posterior superior wall, deep in, due to a periostitis of the deep bony meatus. The discharge will be so profuse that it is evidently coming from a larger cavity than the middle ear and here we have present an acute mastoiditis. An early incision must be made, the diseased bone removed and the ear drained from behind.

Any acute suppurative otitis which, in spite of careful treatment, continues to discharge after six weeks, should be drained through the mastoid antrum in order to clear up the disease and save the hearing.

The pain in mastoiditis is a very variable factor. One may take it that before the periosteum is involved over the process the pain is due to the tension of pus in the cells.

In a very cellular mastoid with a large *aditus* the pus will get away quickly and be profuse, so there will be no tension and no pain, sometimes even on deep pressure, but the examination of the middle ear will tell the tale. The pain will be severe in the bone, not very cellular, where the tension is generally greater and the patient will complain bitterly of it, and the tenderness will be correspondingly great.

The pain is generally early and tenderness marked in ears infected with *Streptococcus hæmolyticus* and this infection is often so rapid that intracranial complications often occur early and so one should not hesitate to drain early in these cases.

One sometimes sees instances in which there has been a naso-pharyngeal infection accompanied by earache and some discharge which soon clears up.

Later the mastoid becomes tender and when one sees the patient one finds a normal tympanic membrane with good hearing and the mastoid painful and tender on deep pressure at some one or more spots.

One suspects that there may be mastoiditis and here one finds great help in the diagnosis in the X ray examination of the mastoid. Both sides should be examined and compared and if the mastoid is affected, one sees the blurring in the cells with the thickened trabeculae showing up well.

When X ray examination is not available, one should not hesitate to look and one will often be surprised at the extent of damage present in the mastoid.

Now the aim of the physician should be early diagnosis and early operation, thus not only saving the patient from formidable complications, but overcoming his disease in the minimum of time and restoring his hearing to normal.

Reports of Cases.

AUTOTRANSFUSION IN RUPTURED ECTOPIC PREGNANCY.

By BERNARD DAWSON, M.D., F.R.C.S.,
Honorary Assistant Gynaecologist, Adelaide Hospital.

THE possibility of restoring to the circulatory system the blood spilt into the peritoneal cavity in cases of ruptured ectopic gestation offers an attractive addition to the *modus operandi* of the gynaecologist. Theoretically there seems to be no objection to the manœuvre. It obviates blood typing, requires not the presence of a donor, the technique is simple and the result satisfactory.

As far as I know, there has not yet been any investigation of possible changes in blood from the peritoneal cavity. Haematological reports are desirable, but, practically, no evil results have followed the reintroduction of such blood into the systemic circulation. During the past month two patients came under my care who afforded opportunities for this usage of blood from the peritoneal sac. Both patients were healthy women, aged twenty-nine and thirty-four respectively. Their pelvic misadventures were of the same acute type, symptomized by rapid and free blood loss with its associated anaemia and shock. This similarity was explained by the fact that each woman had a right interstitial tubal pregnancy involving the cornu of the uterus.

When first seen by me they were extremely blanched; the radial pulse was absent, a small carotid pulse of frequency 148 per minute being palpable; respiration was hurried and anxious, the rate being thirty to thirty-five per minute. In neither case was any delay permissible nor postponement of operation wise.

Prior to opening the abdomen 300 cubic centimetres (ten ounces) of sterile citrate of soda solution were placed in an enamel jug of about one litre capacity. Into this was thrust, so as to form a bag, an abdominal swab of four thicknesses of well washed surgical gauze which was saturated with the citrate solution. The peritoneal sac was quickly opened, the incision elevated and escape of blood prevented. With an ordinary domestic tablespoon blood free from clots was rapidly removed and poured into the citrate solution, care being taken to insure that it all fell inside the gauze bag.

When as much as possible was obtained, in each case about 150 cubic centimetres (fifteen ounces), the operation was rapidly completed, the tubes being carefully examined for signs of infection. The gauze bag was withdrawn

from the citrated blood and its residue examined. A few tiny clots and globules of fat, escaped from the abdominal wall, were found. The citrated blood, measuring about 750 cubic centimetres (twenty-five ounces), was then restored to the circulation through the median basilic vein by the simple means of funnel, tube and cannula. In both instances the effect upon the patient was remarkable. The improvement in colour was visible as the transfusion progressed, in fact the return of a pink tinge to cheeks and pinnae was spectacular to watch.

The effect upon the pulse and respiration was as follows:

Time of Observation.	Case I.		Case II.	
	Pulse.	Respiration.	Pulse.	Respiration.
Before operation	148	32	148	30
After transfusion	114	20	112	20

Within twenty-four hours the pulse rates of both women were 100 to 108. The usual postoperative measures such as the shock cradle, rectal injections of saline solution and glucose and pituitary extract were carried out. Micturition was spontaneous, no catheter being needed. There was no abdominal distension or difficulty in encouraging bowel action. Subsequent recoveries were uneventful.

The method seems to offer many advantages:

1. Speed and simplicity of technique.
2. Elimination of necessity for blood typing.
3. No necessity for a donor.
4. Special suitability in the gravest type of case. It is in these that recent free blood is found in quantity. The less acute cases of ruptured ampullary gestation or of tubal abortion seldom afford sufficient unclotted blood for the purpose.
5. Absence of any reaction or evidence of protein shock.

ENDEMIC TYPHUS FEVER.

By E. L. NEWMAN, M.B. (Sydney),
Mosman, Sydney.

WHILST calling at a certain garage in Mosman on Friday, May 9, 1930, I saw Mr. E.E.C., aged thirty-six, motor mechanic. He complained of headache with aches and pains over the body and limbs and in the back and a feeling of chilliness.

Thinking he was suffering from so-called influenza, I ordered an ordinary salicylate mixture and advised him to go to bed.

The following day, May 10, I was asked to visit him at his home. He appeared very ill, he had a temperature of 40° C. (104° F.) and a pulse rate of 120. He complained of very severe headache and of aches and pains still in his body and limbs and of pain in the back, though this was not marked.

On May 11 these symptoms still existed, especially the headache. The temperature was still in the region of 39.4° and 40° C. (103° and 104° F.) and the pulse was still rapid. The patient was sleeping badly, ordinary hypnotics having little or no effect. These symptoms continued during the following days, especially the headache. The temperature was still 39.4° to 40° C. (103° to 104° F.) with rapid pulse. There was a dry tongue and soreness of the mouth and throat was present almost from the onset. He had also developed a nasty dry cough and complained that this made the headache much worse.

On Tuesday, May 13, and the fifth day of his illness, a definite macular rash was seen at first on the body, rapidly becoming more marked and spreading to the upper and lower limbs, more especially on the extensor surfaces. There was, however, no rash on the face at all. With the appearance of the rash the patient became more ill,

delirium more pronounced and the tongue very dry and somewhat cracked. The patient complained much of this during the next week of the illness. The conjunctivæ became congested, the cough more troublesome and moist with frequent expectoration; continuous examination of the chest, however, only revealed many scattered moist sounds.

This condition existed for the next three days or so and I was frankly puzzled as to the diagnosis. I thought it might be an unusual case of measles with a typhoid state, but the absence of initial coryza and of the well known facial appearance, even though the conjunctivæ were congested, and the absence of rash on the face negated the idea.

Although never having seen a case of typhus, I remembered that the rash of this disease appeared about the fifth day. I found in "Oxford Medicine" an excellent article by Palfrey and Wolbach which exactly fitted the condition.⁽¹⁾ Their definition is:

An acute infectious disease transmitted by the body louse characterized pathologically by lesions of the blood vessels of the skin and of the musculature and central nervous system and clinically by abrupt onset, continuous high fever of approximately two weeks' duration—delirium, a macular and frequently hæmorrhagic eruption of body and extremities, rarely involving the face and accompanied almost constantly by tracheo-bronchitis and often complicated by pneumonia and terminating by rapid lyses.

I then asked Dr. E. S. Morris, of the Department of Public Health, to see the patient with me, although the temperature was somewhat lower, being in the vicinity of 38.3° C. (101° F.) and the patient appeared a little better, he agreed that the patient was still seriously ill and it was decided to remove him to the Coast Hospital.

Here his blood was examined and the leucocytes were found to number 8,000 per cubic millimetre. No reaction was obtained to the Widal test. The Weil-Felix test gave a positive result with *Bacillus proteus* X 19 up to a dilution of one in 960; one in 100 would be regarded as a positive reaction for endemic typhus fever. The Weil-Felix reaction was conducted at the Health Department.

The patient's symptoms began to improve with definite improvement in the delirium and on Tuesday, May 20, the temperature was normal and the mental state clear and the patient progressed slowly but steadily towards convalescence.

I report the case as one of interest and to draw attention to the possibility of other cases arising. From this case it appears to me that by those who, like myself, have had no previous experience of endemic typhus fever, the most likely mistake in diagnosis would be "an unusual case of measles complicated by a typhoid state," but the rapid onset, entire absence of coryza, absence of rash on the face, very severe headache, delirium which is marked especially after the appearance of the rash, and the rapid extreme prostration of the patient should put one on one's guard.

Although the spleen according to Wolbach is not always enlarged, in this case it was definitely so and easily palpable. There was, however, no enlargement of the cervical or other lymphatic glands. Dr. Morris has informed me that some few years ago 143 cases of endemic typhus were reported in South Australia, 55 in Queensland, 93 in Western Australia, one in Victoria and five in the northern rivers district of New South Wales. I understand this is the first case to be reported in the Sydney metropolitan area.

Evidence in the South Australian cases showed the infections were frequently associated with the prevalence of rats in consequence of their being disturbed by the demolition of buildings. It may be only a coincidence in this instance, but some few weeks prior to the commencement of this illness several old sheds, presumably rat infested and immediately adjoining the garage where the patient worked, were demolished as unsightly and insanitary structures by order of the local authority, whilst the house where the patient lived, is definitely rat infested.

I may say that the patient was a returned soldier; he came back home in 1917 and had never been out of New South Wales and scarcely ever out of Sydney since.

Reference.

- ⁽¹⁾ "Oxford Medicine," Volume V, page 439.

PULMONARY ABSCESS TREATED BY ARTIFICIAL PNEUMOTHORAX.

By NORMAN J. SOLOMON, M.B., B.S. (Melbourne),
Medical Superintendent, Wagga District Hospital,
New South Wales.

Mrs. O., aged twenty-eight, was admitted on May 5, 1930. Ten days before admission the patient had had a general anæsthetic for removal of teeth. Three days after the anæsthetic she did not feel well and remained in bed and was seen by her medical attendant. She then had a temperature of 38.9° C. (102° F.), a pulse rate of 110 and a respiratory rate of 28. She was sent into hospital some days later, as her symptoms did not clear up and by this time, too, she had developed an irritating cough, with practically no sputum. At this time no signs could be distinguished in her chest. The temperature remained up, sometimes reaching 40° C. (104° F.).

Six days after admission a few crepitations were heard at the lower angle of the right scapula and about the same time the patient began to cough up large amounts of foul sputum.

She was examined by X rays and a pulmonary abscess, about 3.75 centimetres (one and a half inches) in diameter, was discovered about five centimetres (two inches) from the hilum of the right lung, about the level of the lower angle of the scapula.

For the next few days the patient's condition became much worse in spite of postural treatment and administration of chlorodyne *et cetera* and it appeared as though she was going to die.

I then performed an artificial pneumothorax, injecting three hundred cubic centimetres of air into the right pleural cavity, reducing the negative pressure of - 7 centimetres of water to - 4 centimetres of water. After this she improved in general health greatly, although her temperature still remained in the region of 38.9° and 39.4° C. (102° and 103° F.) and the cough and sputum were still very troublesome.

Six days later I injected another three hundred cubic centimetres of air, reducing the intrathoracic pressure to - 0.5 centimetre of water, that is, about three weeks after the first onset of symptoms.

After this last injection of air the improvement was remarkable. Her temperature returned to normal in four days, the cough and sputum were both markedly diminished and the patient was sitting up in bed wanting to get up. Within ten days she had lost all signs in the chest and had no cough and no sputum and another skiagram taken at this period revealed no signs of the abscess whatsoever. At present, six weeks after being taken ill, she is walking about, to all appearances quite well.

Reviews.

IMMUNOLOGY.

"IMMUNITY IN INFECTIOUS DISEASES," by A. Besredka, translated into English by Herbert Child, is truly a very interesting and educational work.¹ Besredka in this book has brought up to date the results of research work carried out in the Pasteur Institute over the last ten or fifteen

years, dealing more especially with experiments on local immunity and general vaccination.

The bacteriologists of English speaking countries have been following Besredka's papers with great interest for some years, but few have repeated his experiments or even given his preparations a trial. Besredka clearly indicates that a difference of opinion does exist between the English and French schools and these divergent opinions are actually concerned with fundamental principles of immunity. He ably supports his own views by both experimental and practical evidence.

The first hundred pages of this book are the least interesting. Accepted theories of the bactericidal power of the leucocytes and bacterial hæmolysin are found in the first two chapters which are followed by a rather hackneyed discussion on the streptococcus. A chapter is also given to the microbial endotoxins with an excellent method of preparation outlined.

The next hundred pages are devoted to an extremely interesting comparison of vaccines with special reference to sensitized viruses and to the selection of various sites for vaccination.

In the final portion of the book we find an excellent account of the mode of action, preparation and use of bacterial anti-viruses or filtrates and practical illustrations of results of this method of acquiring local immunity.

Besredka's claims may appear to be excessive, but in support he has given us a very large list of reported clinical facts, not only including his own immediate results, but the results of numerous well known workers.

The book is extremely interesting and should be read by every surgeon, physician and bacteriologist, for many of the author's views are in direct conflict with some of our fundamental theories of immunity. If Besredka's views are correct, his results and preparations will have an almost unlimited therapeutic benefit. Beyond a good deal of repetition which should be pardoned, as he advances such novel theories, the book cannot be faulted.

Finally, there is an excellent list of references and a suitable index is appended.

CATARRH OF THE NOSE.

"NASAL CATARRH," by Dr. W. Stuart-Low, a little book of some eighty-two pages, is intended to draw attention to what the author states to be the "main" cause of chronic nasal catarrh, namely, nasal obstruction, and also to advance the view that all nasal catarrh is curable and should therefore be treated.¹ The bibliography is limited; in the preface is reference to an extract from "a leading evening journal" and in the last lines of the last page is a reference to Saint Luke x, 26. There are many assertions which are given as facts, but without proof forthcoming, some of which are certainly true, some are doubtful and some are certainly questionable. For instance, under the title of catarrh are included cases of chronic accessory sinusitis with pus and polypi, and the author states that "all catarrhs are curable." A failure to appreciate the necessity for accurate terminology is shown on page 18, where "chronic frontal antritis" is compared with "the case of the antrum." It is stated that "as applied to the nasal region catarrh is only a symptom" and "is a common accompaniment of many general diseases." There is nothing new in these observations, but the statement that in the tonsils "an auto-vaccination proceeds by which the patient is protected against the organisms in the pus escaping down from the septic middle ear" is an interesting one.

"Never on any account should a Higginson's enema syringe be employed for the purpose of syringing the nose" is a dictum which cannot possibly be accepted and implies a view point which is far too restricted. The author's plea for the preservation of the nasal mucosa is

¹ "Immunity in Infectious Diseases: A Series of Studies," by A. Besredka; 1930. London: Baillière, Tindall and Cox. Demy 8vo., pp. 370. Price: 15s. net.

¹ "Nasal Catarrh," by W. Stuart-Low, F.R.C.S.; 1930. London: H. K. Lewis and Company Limited. Crown 8vo., pp. 94, with thirteen illustrations. Price: 5s. net.

one long recognized by the rhinologist and the pathologist and his advocacy of submucous resection of turbinates is fully in accord with modern views. On page 24 is a remarkable paragraph, too long to quote, but commencing: "I am much in favour of the generation of nascently produced antibodies generated at the immediate site of the inflammatory septic trouble by means of the galvanocautery puncture applied to the roots of nasal polypi . . ."

This book does not appear to be a useful contribution to rhinological literature, but will provide a half hour of entertaining reading to any rhinologist and indeed contains considerable grain amongst the chaff, but if taken by the general practitioner as an expression of authoritative opinion, will lead to many disappointments.

ADVANCES IN MEDICINE.

"GENERAL MEDICINE" of the Practical Medicine Series, 1929, is one of eight volumes on the year's progress in medicine and surgery. It is edited by various authors and is a work that can be highly recommended to all interested in the most recent advances in internal medicine. The book is divided into five parts and contains a great deal of useful information.

Part I deals with infectious diseases and is edited by Dr. Weaver, the well known Clinical Professor of the Rush Medical College of the University of Chicago. It is very ably written, though one perhaps may be inclined to be less optimistic about the results of vaccinotherapy in connexion with many of these diseases. The chapters on scarlet fever are excellent. In the treatment of epidemic encephalitis and of post-encephalitis too much stress is laid on methods of treatment that are of doubtful value. No mention is made of the benefits that accrue from large doses of stramonium for the post-encephalitic rigidity.

Part II deals with diseases of the chest and is in the hands of Dr. Lorason Brown, of New York. A very detailed *résumé* is given of the recent advances in the problems of the prophylaxis and treatment of pulmonary tuberculosis. The question of the Calmette vaccines and inoculations is dealt with, though many will hesitate to accept some of the expressed views without more experience. The paragraph dealing with the selection of patients suitable for surgical intervention represents quite the latest work on this subject and is very capably handled. The report of a case of "Duco" poisoning is interesting and useful, especially from the point of view of a possible health hazard.

In Part III the most recent work on diseases of the blood and blood-making organs and diseases of the kidneys is very well set out by Dr. George R. Minot, Professor of Medicine in Harvard University, and by Dr. Wm. B. Castle, Assistant in Medicine at that institution. This section is doubly interesting in that Dr. Minot is himself one of the pioneers in the epoch-making discovery of the wonderful effects of liver therapy in the treatment of pernicious anemia.

Part IV is devoted to diseases of the heart and blood vessels and this is very well handled by Dr. Stroud, Instructor in Cardiology at the University of Pennsylvania. The syndrome of coronary thrombosis, long included in angina, is stressed and the diagnostic differentiation between these two syndromes is emphasized, since, except for the common indication for rest, the object of treatment usually is diametrically opposite. In the former one is combating a fall and in the latter a rise in vascular tension. The comments on the treatment of heart diseases by J. B. Herrick include a number of valuable conclusions which mean much in the sane treatment of cardio-vascular disease.

Part V which completes the book, is confined to diseases of the digestive system and metabolism and is in the hands of Dr. Ralph C. Brown, Clinical Professor of Medicine of the Rush Medical College of the University of Chicago.

In diseases of the stomach the problem and clinical significance of an achlorhydria is treated in a masterly manner. Many will not agree with the views as expressed by Magee on the dietary causes of peptic ulceration. Recent advances in the treatment of gastric diseases are very concisely yet fully expounded and the importance of the occult blood test in the stools, unknown twenty years ago, is shown to rank with X rays in value as a means of recognizing organic diseases of the stomach. The subject matter in this section is excellently handled. An abstract is given of an excellent study of 556 patients with peptic ulcer admitted to the Peter Bent Brigham Hospital from 1913 to 1926. The paper is by E. O. Emery, Junior, and R. T. Monroe; it is extracted from the *Archives of Internal Medicine*, June, 1929.

The book has a very complete index, both of subjects and authors quoted in the text. It may be read by all physicians with benefit to themselves; it is well printed on good paper and each subject is dealt with in a methodical and, considering the extent of much of the subject matter, in a very concise manner as well. Very little adverse criticism can be levelled at this book which will be a most useful addition to the medical literature.

Notes on Books, Current Journals and New Appliances.

A PLATINUM RESISTANCE THERMOMETER.

In *The Lancet* of March 29, 1930, F. Campbell Smith describes a platinum resistance thermometer which he claims is in several respects preferable to the thermoelectric method described by Benedict. The apparatus is portable, the thermometer is robust and may be applied by an unskilled operator and the galvanometer is direct, reading in degrees Centigrade or Fahrenheit. By means of this instrument a reading accurate to 0.05° C. may be obtained within three to six seconds. Readers are referred to *The Lancet* for a diagrammatic plan and detailed description of the apparatus.

MANUALS ON DIABETES.

Two manuals on *diabetes mellitus* have been received. These have been issued under the authority of the Health Department of the State of Victoria and of the Council of the Victorian Branch of the British Medical Association. One is for the use of Victorian medical practitioners and the other for the use of patients. The manuals are part and parcel of a scheme suggested by Dr. W. J. Penfold, of the Baker Institute, in 1928, to the Chief Medical Officer of the Health Department. The scheme had as its object the reduction of mortality from diabetes. The details as finally adopted after consultation with the Council of the Victorian Branch of the British Medical Association included voluntary notification of patients and the giving of lectures and laboratory instruction to medical practitioners. In other words, the plan as outlined was an attempt at prevention of disease along definite lines. The manual for medical practitioners may be regarded as a complete guide and the tables of food values and so forth will be found valuable. The manual for the patient has been designed for his use after he has left the immediate care of his medical attendant. It has received the approval of the members of the honorary staffs of the Melbourne metropolitan hospitals. The compilers have made use of the works of Joslin, Laurence and Maclean and refer the patient to those of the first two authors. These booklets are so well suited to their purpose that their use should not be confined to the State of Victoria.

¹ "The Practical Medicine Series: General Medicine"; Series 1929: Chicago: The Year Book Publishers. Crown 8vo., pp. 829. Price: \$3.00 net.

The Medical Journal of Australia

SATURDAY, JULY 12, 1930.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract from a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

AN OPPORTUNITY FOR SURGEONS.

A CLAIMANT to the title of surgeon should be able to produce evidence of his knowledge of the basic sciences and of the principles on which the practice of surgery is built, and he should also be able to give proof of practical experience at the bedside and in the operating theatre. Both the theoretical and the practical are necessary. It is generally admitted that examinations are seldom, if ever, an adequate test of knowledge, but it will be recognized that the possession of a higher surgical degree or diploma is a guarantee that the holder has spent some considerable time in the study of underlying principles. On the other hand, the mere possession of a higher qualification does not, *per se*, justify the assumption that the holder is a surgeon. Many well known and excellent surgeons have not bothered about seeking a higher qualification. They have devoted time and energy to study and have perfected themselves in the practical side of their work. The practical aspect includes the capacity for original thought and independence of judgement as well as mere manual dexterity. With the more intense specialization at the present day and the increasing keenness of competition it is inevitable that some criteria of ability will be considered

necessary by the governing bodies of hospitals or other institutions having at their disposal honorary or paid surgical appointments. The setting of standards of this sort is always difficult. It is possible that when a graduate has served for some years in several capacities as resident officer of an institution, his knowledge and aptitude may be so patent to those in authority that his services in an honorary capacity will be secured at the earliest possible moment. This will be but an occasional occurrence. The criterion generally adopted will be the hall mark of some university, college or hospital together with the record of practical work carried out in the presence of those qualified to express an opinion on its value.

The Fellowship of the Royal College of Surgeons of England has for long been regarded as the most desirable of surgical qualifications. Unfortunately the conditions of examination are such that prospective candidates have had to spend a relatively long time in the Old Country; this necessarily is a somewhat costly business and for this reason able graduates have sometimes had to abandon all idea of seeking the diploma. The College of Surgeons of Australasia has recognized this difficulty and has taken steps to overcome it. As Sir Henry Newland explained in his last President's address, it has been the desire of the College to keep in touch with the Royal College of Surgeons of England. As a result of negotiations extending over more than two years, arrangements have been completed whereby the primary fellowship examination of the latter College will be held in Australia in August or September, 1931. These arrangements will be carried into effect, provided twenty-five eligible candidates present themselves for examination. Examiners will be sent from England and the expense will thus be considerable. The deficit that will result, will be borne equally by the two Colleges. This action of the College of Surgeons of Australasia is but further evidence of its sincerity of purpose and of its desire to advance the study of surgery and to raise the standard of surgical attainment in Australia and New Zealand. The resulting opportunity is rare and should be used by many, especially of the younger generation. Even if the possibility of visiting England to sit for the

final examination is remote, the completion of the difficult preliminary step will be an incentive to added effort. The visit of the English examiners next year is admittedly an experiment; unless the response is adequate, the opportunity may not arise again. It behoves those with surgical ambition to bestir themselves, while yet there is time, and to put the matter in hand.

AN EXPLANATION.

OUR attention has been drawn to certain statements made in reference to "Solyptol" in an article by Dr. R. L. Raymond and Mr. E. Q. Manning published in the issue of May 3, 1930.

We desire to state that the opinions expressed are only those of the authors of the article.

We have been further requested to state, and readily do so, that many members of the medical and nursing professions hold "Solyptol" in high esteem and value it as an antiseptic.

Current Comment.

THE USE OF CHARCOAL IN THE UTERUS.

CHARCOAL has been recommended for use in various conditions. It has been used in the form of cachets or biscuits as an absorbent in gastric conditions accompanied by distension. It has been used externally as a poultice to foul ulcers. Its use has been suggested in such conditions as cholera, enteric fever and gastro-enteritis. It has been used as an antidote for alkaloid poisons; it seems to have a special attraction for them. On account of its porous nature charcoal has the power of absorbing gases; for example, it will take up eighteen times its own volume of oxygen. Most, if not all, of its power of absorbing oxygen is lost when charcoal is moistened with water. Its most important action is its power of adsorbing ferments and certain toxins. This action is the result of its surface energy and its surface energy in turn depends on its porous nature.

Latterly attempts have been made to extend the use of charcoal. H. Nahmmacher, following the lead of Benthin and Geller, has used it in obstetrical and gynecological conditions and has reported his results.¹ He points out in the beginning of his article that adsorption depends on the extent of the surface energy, on the surface tension between the adsorbent substance and the liquid and on the surface activity of the liquid. He adds that while, as a result of the adsorption of wound secretion, it is

made much more difficult for bacteria to live on the drained tissue surface, it is true that, as a result of the adsorbent fixative action on the bacteria and on the poisonous properties of bacterial toxins, absorption into the blood stream is greatly retarded, if not rendered altogether impossible. He believes that charcoal treatment is indicated in abortion, especially febrile abortion, in puerperal endometritis and in Cæsarean section after rupture of the membranes. He devotes his remarks largely to the treatment of septic abortion. He uses pencils of granulated charcoal, three and five centimetres in length and about four to five millimetres thick. The pencils are carefully inserted into the uterus; two and sometimes three are used. Crackling and effervescence take place "when the charcoal fixes the uterine contents." A strip of gauze is placed in the cervix to prevent immediate escape of the charcoal paste or foam. After three or four hours the gauze is removed and it is presumed that the uterine wall is then covered with the charcoal suspension. To the astringent and adsorbent action of the carbon is added its action as a foreign body inducing contractions of the uterine wall.

The first thing that will be noted in connexion with this method of treatment, is that it will be of use only when the infection is confined to the uterus, that is, when a sapræmia is present. The crackling and formation of gas will be the result of the chemical action of carbon with oxygen, sulphur, hydrogen and so forth. The disintegration of the charcoal pencil will result in the formation of a suspension of finely divided charcoal which adheres to the wall of the uterus. Apparently an excess of charcoal does no harm. The wisdom of plugging the cervix with gauze while the crackling and effervescence are going on may be questioned. The method is worthy of trial.

UROBILINURIA.

TRACES of urobilin or its precursor urobilinogen may be found in nearly all urine, but it is found in abundance in febrile and other pathological conditions. Considerable discrepancies exist in the estimations of various observers as to the amount daily excreted by normal persons, probably owing to errors in analytical methods. The different methods of estimation of urobilin are spectroscopic, colorimetric and fluorescent; it is also estimated by precipitation with ammonium sulphate. It is generally agreed that some of the stercobilin in the intestine is reabsorbed to reach the liver where it is again converted into bilirubin. Some passes through the liver to reach the kidneys where it is excreted as urobilin or its precursor urobilinogen. The exact method of urobilin formation, however, is not yet thoroughly understood. In health the quantity appearing in the urine is small, but in hepatic disease the amount not intercepted by the liver cells may be greatly increased. There is an accumulation in the blood and easily demonstrable amounts may be excreted in the urine. The intes-

¹ *Surgery, Gynecology and Obstetrics*, May, 1930.

tinal origin of urobilin is generally held, but Whipple and Hooper (1922) asserted that there was no evidence that stercobilin was ever absorbed from the intestine. Kahn held that in addition to the intestinal origin, a diseased liver may form urobilin directly as a product of its cells or indirectly from decomposition of bilirubin in the bile passages. Brule (1922) held that the presence or absence of urobilin in the urine depends on the amount of bilirubin in the blood, the kidney threshold for bilirubin being higher than for urobilin. It is stated that when the amount of bilirubin in the serum reaches its kidney threshold it is excreted unchanged, but when it falls below this point, urobilin is again formed and excreted as such. In mild jaundice urobilinuria occurs, but in severe jaundice, bilirubinuria. It has been asserted that the urobilin test for hepatic efficiency must be accepted with reservation, especially as severe nephritis may prevent its excretion even when in excess in the blood. But Blankenhorn showed that urobilin is not a threshold substance and that renal impairment does not cause its retention. Piersol and Bockus considered urobilinuria one of the most reliable indications of liver damage, but thought that it gave no indication of the degree of deficiency. If the intestinal formation of urobilin be accepted, care must be taken by examination of the faeces to exclude urobilinuria due to abnormal blood destruction.

Increase of urobilin in the urine occurs in diffuse lesions of the liver (fatty and parenchymatous degeneration, the later stages of enlarged liver of alcoholics, cirrhosis, diffuse neoplasms, such as carcinoma), in catarrhal jaundice, in hepatic congestion or stasis of heart disease (especially chronic cardiac jaundice), in the liver degeneration of acute infectious fevers (measles, scarlet fever and miliary tuberculosis). It is also found in pneumonia at the time of resolution, probably due to clogging of the liver with resolution products and hæmoglobin from the affected lung, and in liver abscess in amebic dysentery. Other conditions in which urobilinuria may occur, are pernicious anaemia, hæmolytic states such as malaria, sepsis, eclampsia and plumbism. In increased blood destruction urobilin is increased in the stools (possibly from hæmatin decomposition) and at times in the urine. The latter manifestation may occur even when the liver is healthy.

M. H. Edelman, L. Halpern and J. A. Killian give results of investigations concerning urobilinuria in children with heart disease.¹ They state that urobilinuria in congestive cardiac failure may depend on slackening of the rate of blood flow through the liver (circulatory stasis) or on a diminished oxygen supply to the liver cells. The patients studied manifested varying degrees of cardiac impairment, from grave decompensation to lesions with no apparent clinical symptoms. Five thousand determinations of urobilinuria were made. The subjects were divided into four groups: A "control" group of apparently healthy children, admitted for removal of tonsils and adenoids; a

"comparative" group of children confined to bed for non-cardiac pathological states; an "ambulatory" group attending cardiac clinics and a "decompensated" group with congestive cardiac failure. The results of urobilin determinations in the urine were expressed in terms of concentration (milligrammes per hundred cubic centimetres) and as the total output for the period of twenty-four hours. Of the control group 4% gave positive reactions for urobilinuria. In the comparative group urobilinuria was observed in 35%, the concentration varying from three to 24 milligrammes per 100 cubic centimetres. In the ambulatory group 27% gave positive reactions, the concentration again varying from three to 24 milligrammes per 100 cubic centimetres. In the decompensated group 88% had urobilinuria (three to 586 milligrammes per 100 cubic centimetres with a total output of six to 865 milligrammes during the day). The maximum output was thus found in the decompensated group, being twenty-five times as great as the maximum in the ambulatory and comparative groups. Operation was followed by increased urobilinuria in 86% of the decompensated group, but only in 2% of the control group. During the night and early morning hours urobilinuria disappeared or fell to a low level, the maximum being noted in the afternoon. This is in accord with the observations of others. The suggestion is made that fluctuations of urobilin excretion are not due to variations in renal function, but may be attributed to insufficiency of hepatic function during the hours of activity. In view of the variations of urobilinuria at different periods of the day, quantitative estimations of urobilin in casual specimens of urine are of little value. The most reliable index of urobilinuria is the total output in twenty-four hours.

Urobilinuria makes manifest a disturbance of mild degree in the liver, not discernible in any other way. It can be inferred that the excretion of urobilin in urine would more closely parallel the impairment of function of the liver consequent to cardiac decompensation than it would the bilirubin of the blood serum. Enlargement of the liver was found by Edelman and his collaborators in the children with cardiac conditions and urobilinuria. It was not possible, however, to indicate any parallelism between the magnitude of the urobilinuria or its fluctuations and enlargement of the liver. An increase of rectal temperature has been observed in the initial period of cardiac decompensation coincident with hyperurobilinuria. During the later stages of cardiac decompensation a divergence of the urobilin curve from the temperature curve has appeared. Death is preceded by rising urobilinuria and often by a declining temperature. In children with poor compensation exercise provoked a rise in urobilin excretion, but had no constant effect on the body temperature. The important suggestion is made by Edelman, Halpern and Killian that the presence of urobilinuria may be used to grade the exercise or activity of a child with a cardiac condition.

¹ *American Journal of Diseases of Children*, April, 1930.

Abstracts from Current Medical Literature.

OPHTHALMOLOGY.

Removal of Lead Shot from the Vitreous.

G. H. CROSS (*American Journal of Ophthalmology*, January, 1930) describes a method of removing lead shot from the vitreous and reports that of the four patients operated upon one retained normal vision. The foreign body must be accurately localized by X rays. The instrument used is a wire loop shot forceps introduced through a scleral incision in cooperation with an expert fluoroscope operator. Experience showed the necessity of using short instruments to suit the small space between the eyeball and the plate.

Chorioideremia.

S. WOLF (*Archives of Ophthalmology*, January, 1930) describes two cases of absence of chorioid and reviews the reports of ten previous cases. It was first noted by Manthner in 1871 who examined a man of thirty-two, complaining of poor vision all his life. The patient also stated that he could see only straight in front and almost nothing at night. A brother was similarly affected. Manthner, expecting to find evidence of *retinitis pigmentosa*, was surprised to discover that the entire fundus was a whitish green colour. The discs were, however, normal and also the retinal vessels, though somewhat smaller. None of the chorioidal vessels was visible except a few in the macular region. The patient had two to three diopters of myopia and $\frac{20}{200}$ vision. The peripheral fields were contracted to about ten degrees in each meridian. The author's two patients were brothers, aged forty and forty-two. Their fundi presented the same picture. All the patients reported upon were males and all were myopic. No anatomic studies have ever been made. It was noted that the anterior part of the eyes was normal.

Retinal Detachment.

J. GONIN (Annotation in the *British Journal of Ophthalmology*, February, 1930) has introduced a new method of surgical treatment of retinal detachment which has been favourably spoken of by Vogt, Amsler, Dubois and Arruga. He has published several articles in the French journals during the last three years and has brought the subject forward in the recent ophthalmological congress in Holland. In brief, the idea is that detachment will be cured if the hole or tear in the retina is blocked up in some way and the best surgical method is with the Paquelin cautery through a two millimetre incision in the sclera. Prolonged search with the ophthalmoscope may be necessary to find a hole—it is found most commonly in the anterior

part where the retina was first detached. When the hole is found with the ophthalmoscope, it is advised to make two marks on the conjunctiva near opposite sides of the limbus with aniline gentian violet stain by means of a hypodermic needle; these marks are placed on the conjunctiva close to the limbus in ophthalmoscopic line with the hole. When satisfied, the observer tattoos the two spots with indian ink to give a radial line pointing to the located hole for use at operation. The distance of the hole from the *ora serrata* is calculated in disc diameters, the *ora serrata* being assumed to be at the extreme limit of ophthalmoscopic vision. The disc diameter is 1.5 millimetres and the distance of the *ora serrata* from the limbus is eight millimetres. Hence the distance of the hole from the tattoo mark on the limbus can be stated in millimetres. A two millimetre radial incision is made with a von Graefe knife at the position determined, care being taken not to enter so deeply as to damage the retina; the heated Paquelin cautery is plunged through the incision for a second or so. The conjunctiva is sutured; both eyes are bandaged and the patient kept in bed for eight days.

Chorioidal Sarcoma Treated by Radium.

R. FOSTER MOORE (*British Journal of Ophthalmology*, April, 1930) reports the case of a man, sixty-five years of age, with melanotic sarcoma of the chorioid who was treated by the intraocular insertion of radon seeds. The patient was blind in the other eye and refused enucleation. The tumour presented a dark globular mass in the lower part of the globe and was located carefully for the subsequent proceeding. Under general anaesthesia the conjunctiva was incised and the flap dissected back to expose the sclera. This was opened over the estimated position of the thickest part of the growth and a radon seed of one millicurie strength filtered through 0.5 milligramme of platinum was inserted. About 2.5 centimetres of black silk attached to the seed was left outside the sclera for subsequent removal. No definite reaction followed. The seed was removed fourteen days later. Three months later another seed of radon of five millicuries was inserted and removed in ten days. Eight months later the growth was definitely smaller and shrunken to such a degree that it was seen with difficulty by an observer looking down behind the iris. There was some opacity of the lens, reducing vision to $\frac{2}{60}$. The suitability of the treatment for intraocular sarcoma generally is discussed by the author.

Tattooing the Cornea with Gold and Platinum Chloride.

D. K. PISCHEL (*Archives of Ophthalmology*, February, 1930) describes the technique of tattooing the cornea with gold and platinum chloride. The area to be stained is outlined with a large

trephine or knife and the epithelium is scraped off. A cotton carrier dipped in faintly acid 2% gold chloride solution, not too wet, is held against the denuded area. A fresh applicator is used every minute; after three minutes there will be a brown and after five minutes an almost black stain. Epinephrine (which must not be used previously) or 2% tannic acid is then dropped on the surface of the cornea for two minutes. The eye is washed with normal salt solution and then bandaged. The results are moderately gratifying and the risks few. In using platinum chloride the eye is washed with sterile distilled water instead of salt solution. Platinum chloride solution 2% is then applied on an applicator for two minutes. It is reduced with hydrazine hydrate for twenty-five seconds, then washed with sterile water. The colour should appear promptly by this time. Two minutes later the eye is washed with normal salt solution and bandaged. The author recommends staining the denuded area with fluorescein to find out whether the scraping has been evenly done.

Trephining in Glaucoma.

A. S. GREEN, L. D. GREEN AND M. I. GREEN (*Archives of Ophthalmology*, March, 1930) recommend a modification in the usual technique of cornea sclera trephining. It is emphasized that the trephine must be superlatively sharp. The trephine should be so placed that it leans towards the scleral instead of the corneal side, so that the hinge of the disc is at the limbal instead of the scleral side. The moment the iris prolapses into the trephine opening, the iridotomy or iridectomy is to be performed without the prolapse being allowed to increase and this must be done without taking hold of the iris with forceps. This latter point is insisted upon. All that is necessary is to snip the iris at the scleral side of the opening or to cut off the smallest possible piece of iris before removing the disc of sclera. This should not be done until the iris has resumed its position in the anterior chamber. If necessary, the eye ball may be quietly massaged under the lid and after the pupil has become round, the disc is cut off. The results in chronic and acute glaucoma have been more than 90% successful.

LARYNGOLOGY AND OTOTOLOGY.

Vincent's Angina.

PHILIP FRANK (*The Laryngoscope*, December, 1929) records a line of treatment for Vincent's angina which he has followed for the past nine or ten years. All infections were verified by bacterial examination and the effects of therapy noted thereby as well. After removal of the membranous coating or the caseous necrotic debris the raw surface is

swabbed with ordinary tincture of iodine, directed against the fusiform bacillus, followed by thorough swabbing with Fowler's solution, directed against the spirillum. In addition Fowler's solution is prescribed internally, ten drops being given three times a day for five or six days. In no instance was it found necessary to make more than three or four applications once each day to obtain complete disappearance of the organisms and a cure of the lesion.

Bone Conduction.

C. S. HALL-PIKE (*The Journal of Laryngology and Otology*, January, 1930) discusses bone conduction. He discusses the prevailing theories of the Schwabach and Bing phenomena and their difficulties. The theory is put forward that increased bone conduction is a screening effect. Two lines of work bearing upon the possible truth of such a theory are indicated. The first concerns the so-called absolute bone conduction test. The second concerns the effect upon bone conduction tests of absolute silence. Limits of variation of bone conduction for the tuning forks to be used with the employment of a number of individuals with normal hearing are established and are shown to be fairly wide. Studying the effects of silence upon the Bing phenomenon in normal individuals, the author finds that the period of after perception upon occlusion of the meatus is constantly lowered in absolute silence. The results of effects upon the Weber test of absolute silence are found to be inconclusive. Bone conduction tests were carried out in a series of patients with conducting deafness. Comparisons were made of the results obtained in an ordinary room with those obtained in the silence room. Much the same results were obtained by the use of the absolute bone conduction test. Patients in whom the results of the ordinary Schwabach test are round about the normal, manifest a definite loss in the silence room or with the absolute bone conduction test. In these there is thought to be a true loss of cochlear sensibility. This is latent under ordinary circumstances of the Schwabach test. The author lays stress on the importance of the absolute bone conduction test in revealing this loss. He suggests that latent cochlear loss in the early stages of chronic middle ear deafness is the most important factor in guiding prognosis and treatment. The importance of the absolute bone conduction test in revealing this loss is accentuated.

The Lower End of the Oesophagus at Birth and in the Adult.

HARRIS P. MOSHER (*The Journal of Laryngology and Otology*, March, 1930) in the Semon lecture for 1929 gives an illustrated account of his anatomical and clinical work on the lower end of the oesophagus at birth and in the adult. The most striking abnormality of the oesophagus at birth is

the narrowing of the cardia. Among seventy-five babies dead at birth he found two instances of narrowing both of the cardia and the pylorus. In each case there was a pronounced dilatation of the lower third of the oesophagus. With reference to the oesophageal sphincter he states that at birth a cardiac sphincter is often present. In the adult the cardiac sphincter is more constant and easier to demonstrate. A description is also given of the X ray findings in cases of cardiospasm when the barium striped bag is used. Two major anatomical facts are brought out in the paper. First, the oesophagus comes to a point at the edge of the left crus, then changes its axis and is confined between the crura until it reaches the stomach. This anatomical formation explains the barium picture of the lower end of the oesophagus and locates the point of physiological closure on inspiration. Second, forced inspiration causes a more complete closure of the crural angle and the point of closure of the oesophagus jumps upwards a centimetre, giving the impression that that much of the oesophagus is suddenly amputated. The major clinical conclusions are as follow. As a result of infection transferred from adjacent glands the various components of the oesophageal wall may show at birth a localized or a generalized hypertrophy; ulcer of the oesophagus occurs at or before birth; a pouch of the fundus of the stomach is found at birth; infection about the lower end of the oesophagus can cause a gluing of the fundus of the stomach to the oesophagus and an invagination of the lower end of the oesophagus into the stomach; segmentation is occasionally found in the muscles at the lower end of the oesophagus, making the oesophagus at this point structurally weak. The author has had twenty-five consecutive cases of cardiospasm in which there was a crural crease in the oesophagus. He believes the crease to be due to a fibrosis of the connective tissue in the crural ring associated with a fibrosis of some of the muscle bundles of the crura. It is the result of infection transferred from neighbouring organs. The fibrosis of the crural ring is best dilated under fluoroscopic vision. The barium striped bag under manometric control is very efficient for this purpose. The thesis of this paper is that the oesophagus can be the subject of infection before birth and that infection plays the major part in cardiospasm.

Nasal Obstruction in Children.

WILLIAM WESLEY CARTER (*The Laryngoscope*, January, 1930) describes an operation for the relief of nasal obstruction in children due to a deflected cartilaginous septum. The usual vertical incision down to the cartilage is made at the mucocutaneous junction. The mucous membrane is then elevated well back as far as the deviation extends. A narrow strip of cartilage is then removed

horizontally from the crest of the deviation throughout its entire length. A parallel incision through the cartilage above and below is then made. Great care is taken not to perforate the mucous membrane on the opposite concave side which has not been elevated from the cartilage. The upper and lower segments of the septum can now be pushed into the median line without overlapping and can be held in a vertical position by means of gold wire splints which are fashioned at the time to suit the requirements and are adjusted in each nasal cavity to hold the septum in a vertical position.

The Lingual Tonsil.

M. VALENTINE MILLER (*The Laryngoscope*, February, 1930) draws attention to the lingual tonsil as the underlying cause of various complaints. The lingual tonsil is frequently overlooked in examination of the throat and the laryngeal mirror should always be used. Hypertrophy is the most common complaint, but acute and chronic infections may occur with moderate frequency. The incidence of involvement of the lingual tonsil is greater in women than men and may occur in infancy. The author is of the opinion that the best treatment for chronic involvement of the lingual tonsil is surgical removal and that the use of the galvano-cautery is also valuable.

Non-Opaque Foreign Bodies in the Right Bronchus.

V. E. NEGUS (*The Journal of Laryngology and Otology*, February, 1930) records the occurrence of three non-opaque foreign bodies in the right bronchus. In two of the patients the signs and X ray appearances of ball-valve obstruction described by Iglauer were typical. The foreign bodies were pieces of nut. In the third patient the changes due to prolonged presence of a non-vegetable foreign body (rabbit's vertebra) were very pronounced. The author emphasizes the necessity for the safe and harmless procedure of bronchoscopy on patients suffering from unexplained lung disease, as his three patients might easily be described as having unsuspected foreign bodies.

Objective Tinnitus.

G. GILL-CAREY (*Proceedings of the Royal Society of Medicine*, March, 1930) has demonstrated a female patient complaining of severe tinnitus. A crackling sound, not synchronizing exactly with the pulse, could be heard by the unaided ear a foot away from the patient. There was no clonic contraction of the palatal muscles and the left Eustachian tube, seen through the naso-pharyngoscope, was normal. Pressure on the carotid artery did not modify the sound. Radiographic examination of the left temporal bone revealed no abnormality. The Wassermann test yielded no reaction.

Special Articles on Diagnosis.

Contributed by Request.

II.

INTUSSUSCEPTION.

INTUSSUSCEPTION is by far the commonest cause of intestinal obstruction in infants and a comparatively common cause in older children. About 75% of the patients are males.

In typical cases the symptoms are acute from the onset and remain urgent until the condition is relieved or the child dies. There are patients, however, generally older children, in whom the symptoms are not so acute, and after a more or less sudden onset, with pain and vomiting, the child begins to lose weight, but may linger on for several weeks before actual intestinal obstruction occurs. Such conditions are often called chronic intussusception. The symptoms, therefore, vary somewhat with the age of the child, the site of invagination and the degree of strangulation of the involved bowel.

Infants between the ages of three and nine months are the ones most liable to be affected. In an analysis of 177 patients whom I have treated, the ages of the children affected were found to be as follows:

From one to three months	2
From three to six months	58
From six to nine months	62
From nine to twelve months	26
From twelve months to three years	22
From three years to six years	2
From six years to twelve years	5

Total 177

The onset in infancy is almost always quite sudden, but occasionally one gets a history of diarrhoea having preceded the onset by a few days. Infants affected are almost invariably healthy and robust. Weaklings seem to escape this trouble. The main symptoms are pain, vomiting and the passage of blood and mucus. The pain is indicated by screaming and drawing up of the legs. The child becomes intensely pallid and then breaks out into a cold sweat. The pulse at the onset is rapid and the temperature subnormal. These symptoms of shock soon pass off, but the pallor may remain until the intussusception has been reduced. It is surprising, however, how well the child may appear between the paroxysms. A more or less normal motion may be passed soon after the onset or after an enema is given. This is due to the emptying of the large bowel below the obstruction. Similar paroxysms recur at short intervals and if the condition is not relieved, the vomiting becomes persistent and the usual signs and symptoms due to the severe toxæmia of intestinal obstruction supervene. The eyes become sunken, the tissues dehydrated, the patient becomes collapsed and drowsy and the spasms disappear. Death ensues as a rule in a few days, although I have known an untreated patient with acute intussusception to linger on for a fortnight. The passage of blood and mucus from the bowel, accompanied by much straining, generally occurs within a few hours from the onset, but may be delayed longer and in a few cases, usually in older children, there may be no blood passed at all. The passage of blood is a more constant sign in young infants. As a rule it is present whenever the intussusception involves the large bowel, either primarily or secondarily. In young infants, where the intussusception generally begins either at the *caput caeci*, the ileocaecal valve or in the last few inches of the ileum, blood is almost invariably passed. It is this sign which makes the mother seek advice, even though she has failed to do so on account of earlier symptoms. I have found that where the intussusception has involved small bowel only, blood may not be passed, even in patients in whom the trouble has remained undiagnosed for forty-eight hours

or more. In patients in whom the intussusception has begun in a Meckel's diverticulum, blood may not be passed. In such cases, however, if several rectal injections are given, so as partially to reduce the trouble, a small amount of blood may appear with the return of the last injection. This is probably due to the fact that the blood is walled off between the *intussusceptum* and *intussusciptens* and is released with the partial reduction of the intussusception. Two cases illustrating the absence of blood may be quoted.

A male child, aged two years, was seen by me forty-eight hours after the onset of symptoms. He had been vomiting persistently during this time. Repeated enemata had been returned, but there had never been any blood in the return. At operation the intussusception was found in the small bowel about three feet from the ileocaecal valve. As it was impossible to reduce any portion of it, a resection was done.

A female child, aged seven years, was seen by me twelve hours after the onset. There had been persistent pain and vomiting since the onset. An enema had returned with a small faecal result. Three rectal injections were given from a height of three feet. The first two returned clear and the third showed a slight tinge of blood. At operation the intussusception was found to have begun in the free end of a Meckel's diverticulum.

Physical Signs.

In intussusception the abdominal wall is always comparatively soft and flaccid and moves with respiration. There is not the muscular rigidity present which characterizes the inflammatory conditions of the abdomen; hence the intussuscepted bowel can always be felt. If palpated for gently and with a warm hand, it is usually easily felt without the aid of an anæsthetic, although in doubtful cases it is wise to give one. The position of the mass depends, of course, on the portion of bowel involved. In long standing cases or when it has begun in the transverse colon, it can often be felt *per rectum* and in rare and neglected cases it protrudes from the anus and has been mistaken for prolapse of the rectum. As a rule within five or six hours of the onset it is felt either in the region of the hepatic flexure of the colon or in the umbilical region.

The mass is generally sausage shaped, owing to the drag of the mesentery on the one side of it. Sometimes it can be felt to harden under the hand owing to muscular contraction.

Intussusception in Association with Other Diseases.

Intussusception occasionally occurs during the course of an attack of gastro-enteritis, but such an occurrence is rare. There is no reason, of course, why intussusception should not occur as an accidental complication of any of the common diseases of infancy. Cases have been recorded during the course of enteric fever, tuberculous disease of the bowel, pertussis and Henoch's purpura. In the latter complaint it may easily be overlooked owing to the similarity of symptoms.

Intussusception of the Colon.

When intussusception begins in the transverse colon, the symptoms are not so acute as in those beginning in the small bowel. This is in keeping with the symptoms of intestinal obstruction generally. This variety is in my experience much commoner in older children. The initial symptoms of profound shock are usually absent; blood is passed early and the usual mass can readily be felt. The intussusception soon reaches the rectum and may protrude from the anus. Some authorities assert that abdominal distension is a marked feature of these cases, but such has not been found in patients who have come under my observation.

A patient illustrating this type of case is at present under my care. The child is a male, aged six years. He was suddenly seized with abdominal pain forty-eight hours before admission to the Children's Hospital. About three hours after the onset he passed a considerable quantity

of blood. On admission he did not look particularly ill, but was rather pale. His temperature was normal. There was neither distension nor abdominal rigidity. A mass could easily be felt without the aid of an anæsthetic and it was situated in the left lower quadrant of the abdomen. He was given an injection of saline solution from a height of three feet and the mass moved to the umbilical region. The abdomen was opened and a very tight intussusception was found in the transverse colon.

Intussusception Limited to the Appendix.

Intussusception sometimes begins in and remains limited more or less to the appendix. There are two varieties of this form. In one the appendix is completely inverted and in the other inversion begins at the base of the appendix and, after it has proceeded for a very short distance, the caecum begins to become invaginated and the appendix becomes enclosed in the inverted *caput caeci*. Further progress is slow in both varieties and so complete intestinal obstruction may not occur for several weeks, if, indeed, it occurs at all. The patient suffers from paroxysmal attacks of abdominal pain associated with vomiting. There may be no blood in the stools and the bowels may be loose. The temperature is not usually elevated. A small mass can be felt in the right iliac fossa and this may easily be mistaken for a mass of tuberculous glands or for an appendiceal abscess. The absence of a raised temperature should enable one to exclude the latter condition. The continued pain and vomiting generally make these patients lose weight rapidly.

Jejunogastric Intussusception.

After the long loop gastro-jejunostomy operation intussusception of the jejunum into the stomach sometimes occurs. In these cases there is the usual paroxysmal attacks of pain, vomiting and symptoms of intestinal obstruction associated with the presence of a tumour in the epigastric region. The markedly distended loop of jejunum can also be seen. The material vomited contains blood and is very offensive.

Recurrence of Intussusception.

Since nothing but reduction is accomplished by injection or operation in most cases, it is not surprising that recurrences occur. I have seen five recurrences in a child under eighteen months and another intussusception recurred three times. The attacks may be separated by a few days or several years. Some time ago I operated on a child aged eleven years for intussusception and the same child had been operated on by Sir Charles Clubbe for intussusception when four years of age. In the few cases in which I have had an opportunity of seeing both the original operation and the one for recurrence, the intussusception has started in the same place.

Differential Diagnosis.

Sir Charles Clubbe has always stressed the advisability of listening carefully to the history of the illness as given by the mother and, if this is done, few mistakes will be made in the diagnosis of the usual type of case that affects young infants. The sudden onset, with screaming, the pallor, soon followed by the passage of blood, is quite unlike any other illness. The absence of a raised temperature excludes all inflammatory conditions. Occasionally one sees gangrenous appendicitis in young infants. Such a case is recorded in *The British Medical Journal* of March 29, 1924, page 571. In this case a diagnosis of intussusception was made, but the operation revealed a gangrenous appendix. The flaccidity of the abdominal wall and the absence of abdominal distension in most cases of intussusception is characteristic. In the case mentioned above the child had a high temperature and the abdomen was distended. It should also be noted that, even in infancy, a scybalous mass can sometimes be felt in the colon and may be mistaken for intussusception.

Henoch's purpura has often been diagnosed as intussusception, because of the passage of blood and the occasional presence of a palpable tumour, together with the absence of a raised temperature. In this complaint, however, there is generally some swelling of certain joints and there is

usually evidence of purpura elsewhere, generally in the form of petechial hæmorrhages.

Ileo-colitis is common in young infants and may easily be mistaken for intussusception. In this complaint there is faecal matter with blood in the stools which are generally foul smelling. The characteristic palpable tumour, moreover is absent.

Intestinal colic due to dietetic causes may arouse the suspicion of intussusception. Here, however, all the classical signs of intussusception are wanting. One sometimes sees cases in which an infant previously healthy is suddenly seized with abdominal pain associated with symptoms of severe shock, but on examination nothing abnormal can be found and the child has no further trouble. I feel sure that some of these cases are due to intussusception which has undergone spontaneous reduction, and it is advisable to keep such infants under close observation for at least twenty-four hours.

P. L. HIPSLEY, M.D., Ch.M. (Sydney), F.C.S.A.,
Honorary Surgeon, Royal Alexandra Hospital
for Children, Sydney; Honorary Surgeon,
Royal Hospital for Women, Paddington.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Royal Prince Alfred Hospital on May 8, 1930. The meeting took the form of a series of demonstrations by the members of the honorary staff.

Primary Anæmia.

DR. E. W. FAIRFAX showed a male patient, aged thirty-one years, who had been subject to rheumatism for four or five years. Several months previously he had experienced a particularly severe attack. Two months later he had had an attack of colitis lasting two months. During this time he had passed frothy and offensive stools. One week after discharge he had had another attack of acute colitis with a temperature of 40.3° C. (104.6° F.); the stools had contained blood and mucus. For six months he had suffered from gradual loss of strength. Headaches had been troubling him for three months and were frequent and severe. Giddy turns were common. He suffered from occasional epistaxis. He had had continuous fever for two months. Six months before admission the erythrocytes had numbered 2,200,000 per cubic millimetre. Six weeks before admission they had numbered 830,000 and the leucocytes 10,000 per cubic millimetre (neutrophile cells 80%). Two weeks before admission the erythrocytes had numbered 630,000 per cubic millimetre. On examination the patient was extremely pale, his teeth were carious. The spleen and lymphatic glands were enlarged. A systolic murmur was heard at the aortic and pulmonary areas of the heart. The second sound was accentuated. X ray examination of the chest had revealed no abnormality. An attempt at blood culture had yielded no growth of organisms. No occult blood, ova or parasites had been found in the stools.

On admission a blood transfusion had been given and subsequently the erythrocytes had numbered 1,560,000 per cubic millimetre. The hæmoglobin value had been 30% and the colour index 0.9. Poikilocytosis, anisocytosis and macrocytosis and polychromasia had been present. Nucleated erythrocytes had been found. Before the transfusion the leucocytes had numbered 16,740 per cubic millimetre; of these neutrophile cells had been 71.5%, lymphocytes 25%, monocytes 3% and basophile cells 5%. A second attempt at blood culture had failed. It was pointed out that since admission the cardiac apex beat had gone outwards 1.25 centimetres (half an inch), a pericardial rub had developed and the temperature had risen to 40.2° C. (104.4° F.) and the pulse rate to 130 in the minute.

Pulmonary Neoplasm.

DR. M. LIDWILL showed a male patient, aged nineteen years, who had complained of pain in the right side of the chest for two and a half years. He had suffered from four attacks of sudden pain in the previous two and a half years. Pain was present in the right side of the chest during respiration. The patient had had some cough during attacks of pain and he also had occasional blood stained sputum. He had slight dyspnoea on exertion. He had had acute rheumatism at eight years of age. A diagnosis of pulmonary neoplasm had been made.

Paget's Disease.

DR. B. T. EDYE showed a male patient, aged thirty-eight years, who had been admitted to hospital on account of a fractured femur on April 10, 1930. The fracture had occurred at the junction of the upper and middle thirds of the bone and there had been an overlap of 3.75 centimetres, the distal fragment being displaced backwards and in a medial direction. The patient was suffering also from Paget's disease. The appearance of the bones was typical of this condition. Hooks had been inserted into the condyles of the femur and the fragments manipulated into position. The result of treatment of the fracture had been satisfactory.

Dislocation of the Lunate and Fracture of the Navicular Bones.

DR. RICHARD FLYNN showed a male patient who had been admitted to hospital on account of an injury to the chest. Movements of the wrist had been greatly restricted. X ray examination had revealed dislocation of the lunate bone and fracture of the navicular. These bones had been removed and the result was good.

Cerebral Tumour.

DR. H. R. G. POATE showed a patient who had been operated on for a tumour of the brain. The report of this case will be published in a subsequent issue.

Ulceration of the Skin.

Dr. Poate also related the clinical history of a patient who suffered from extensive ulceration of the body. He showed pictures of the lesion. This case will be reported in a subsequent issue.

Bovie Diathermy Apparatus.

Dr. Poate gave a demonstration of the Bovie diathermy apparatus.

Granuloma.

DR. E. H. MOLESWORTH showed a female patient, aged thirty-five years, who was born in England and had lived in Australia for eight and a half years. She had spent seven years at Emerald, Queensland. Two years previously the patient had dropped a box on to the dorsum of the foot. The foot had been tender ever since. Six months previous the area, the size of a two shilling piece, had become affected like a bruise. The area affected had gradually spread and a red circle had formed around it. During the last two months two small spots had appeared, one just distal to the main lesion and the other at the base of the third toe. On examination several purple coloured raised plaques were seen. One was polymorphic in shape, it was five centimetres broad and 3.75 centimetres in length. It had a definite edge, and a raised border. Gross tactile sensation was present, but all other forms of sensation were absent. There were two small raised plaques, similar in every way to the larger area, except that they were non-sensitive. At an area on the antero-lateral aspect of the left leg in its lower third there was no involvement of the skin, but the patient complained that the area was numb. The patient's blood had failed to react to the Wassermann test. A snipping had been taken from the larger area and the pathologist's diagnosis was that of granuloma possibly due to Hansen's bacillus. It had been found impossible to isolate Hansen's bacillus.

Treatment had consisted in eighteen intramuscular injections of "Alepol" and iodide of potash was being given in increasing doses.

Achlorhydria.

DR. ERIC SUSMAN showed several patients who were suffering from achlorhydria. These cases will be reported in a subsequent issue.

Rupture of the Urethra.

DR. J. C. STOREY showed a male patient, aged twenty-one years, who had been admitted on March 24, 1930, after having fallen down a companionway and having straddled a rail. On admission he had had suprapubic pain and had been unable to pass his urine. On examination there had been no bruising of the perineum, but blood had dripped from the urethra and dulness had extended above the pubes to the level of the umbilicus. On the same day operation had been performed. A catheter had become obstructed in the membranous urethra. An incision had been made into the perineum and the membranous urethra had been opened. A catheter had been passed down the penile urethra into the bladder and a suprapubic drain inserted. Four days later the penile catheter had been removed and two days after that the suprapubic drain had been removed. The patient had made an uninterrupted recovery and no stricture was demonstrable on the passage of sounds.

Skin Grafting.

Dr. Storey also showed a woman, aged thirty years. The patient was an epileptic and had fallen into an open fire during a seizure in March, 1929. A series of five grafts had been made to the back from the arm and the leg.

Hæmoperitoneum.

Dr. Storey's third patient was a woman, aged nineteen years, who had been knocked down by a motor car on March 16, 1930. The front and back wheels had passed over her abdomen. On examination she had been very pale and the marks of the wheels had been visible on the upper part of the abdomen. The abdomen had been rigid. The liver dulness had been normal, but shifting dulness had been present in the flanks. Blood had been present in the urine. Laparotomy had been performed under ethylene anaesthesia. The abdominal cavity had been full of blood. The stomach and duodenum had been intact and the abdomen had been closed. The patient had been discharged on April 14, 1930, after an uncomplicated recovery.

Plastic Operation on the Foot.

DR. D. J. GLISSAN showed a girl who had been severely burned on the foot some years previously. As a result considerable contraction had occurred and a claw foot had resulted. When the patient reported at the Royal Prince Alfred Hospital she had had a pronounced deformity and had complained of pain beneath the forefoot on walking. At operation on January 14, 1930, all the scar tissue had been removed, the sole of the foot had been placed against the calf of the opposite leg and a broad pedicled flap had been swung round and sutured at appropriate edges. Fourteen days later the base had been cut away and the remainder of the defect on the foot had been sutured. Dr. Glissan explained that it had been his intention to operate at a later date in order to correct the claw foot, but the deformity had so far improved that he did not think that it would be necessary to do anything further.

Injury to the Radial Nerve.

Dr. Glissan's second patient had suffered from a fracture of the right humerus about 1920, the radial nerve being completely torn across. In June, 1926, the patient had been operated on and the nerve had been sutured without success. In November, 1924, tendon transplantation had been carried out as follows: The *pronator radii teres* had been sutured to the radial extensors of the wrist, the *flexor carpi radialis* to three thumb extensors and the common

extensor slip to the index finger, the *flexor carpi ulnaris* to the remaining three common extensor slips. The patient had returned to the country at the end of April, 1924, with strong and full control over his movements of extension. At the time of demonstration, owing to the complete wasting of the extensor group, the points of entry of the transplanted tendons into their recipient tendons could be well made out. The point of division of the radial nerve was just below the origin of the nerve to the *brachioradialis* and the latter muscle was intact.

Inguinal Hernia.

DR. R. A. MONEY described an operation he had performed for radical cure of a recurrent direct inguinal hernia. Unfortunately he was not able to produce the patient who had departed into the country, but when seen about a month previously the result had been excellent. The method adopted was that described by Hodgkins, of Boston, in the issue of *Surgery, Gynecology and Obstetrics* of December, 1928. The sac of peritoneum was removed in the usual manner and the ligated neck stitched up beneath the lower border of the internal oblique muscle by passing the ends of the ligature through the muscle on a needle and then tying them. The original skin incision was then carried across the mid-line of the abdomen and the subcutaneous fat and fascia dissected up to expose the anterior sheath of the *recti abdominales* muscles. Three strips of fascia were then cut obliquely downwards and outwards from this sheath at intervals of about one centimetre, terminating just medial to its lateral border. A Gallie's living suture needle was threaded on to each strip in turn; it was passed through the aponeurosis of the external oblique muscle where it joined the rectus sheath, through the inguinal ligament from before backwards and then, superficially to the cord, through the lowermost fibres of the internal oblique muscle or the *fals inguinalis* from behind forwards. Each strip was finally drawn through itself until the lower edge of the internal oblique muscle and the *fals inguinalis* were approximated, as required, in front of the cord to the inguinal ligament and there fastened with a silk ligature. The aponeurosis of the external oblique muscle was overlapped over this. Nothing had been done to the gaps thus left in the sheath of the *recti abdominales* muscles and, although when relaxed these muscles appeared somewhat prominent in the lower part of the abdominal wall after operation, no inconvenience or weakness occurred.

A MEETING OF THE OBSTETRIC SECTION OF THE QUEENSLAND BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the B.M.A. Building, Adelaide Street, Brisbane, on April 23, 1930, Dr. F. A. HOPE MICHOD, the President, in the chair.

Quarterly Report.

The first quarterly report for the third year ending March 31, 1930, was read and adopted.

Fibroid Tumour and Pregnancy.

DR. F. A. HOPE MICHOD showed a specimen of a uterus showing a fibromyoma of the wall which had recently become submucous. Three bleeding points could be seen on the mucous surface. The patient had had no symptoms of a fibroid before she became pregnant and there had been no increase in the menstrual flow. The patient had aborted at about two and a half months and had had repeated floodings after the abortion for about three months in spite of a curettage. Eventually the patient had had a hysterectomy to terminate the hæmorrhage. The specimen had been shown to demonstrate the stimulus pregnancy had had on the growth of a fibroid tumour.

Contraction of the Pelvis and Disproportion.

DR. K. WILSON read a short paper on the management of contraction of the pelvis and disproportion as practised at the Rotunda.

Dr. Wilson said that contraction of the pelvis and disproportion were discussed together as their treatment was

identical. There might be disproportion without pelvic contraction and conversely pelvic contraction but no disproportion. The ultimate decision as to whether a patient would deliver herself depended as a general rule on the size of the foetal head relative to the pelvis of the mother in each individual case. For this reason there were few hard and fast rules laid down for the conduct of these cases, but the importance of close observation and clinical experience was stressed. Antenatal diagnosis was recognized as the keynote of success in the treatment.

In the 1928 series of 1,979 deliveries, disproportion had occurred eighty-seven times, a rate of 4.4%. The various methods of delivery in the eighty-seven cases had been: Cæsarean section, forty (lower segment operation, 27; classical section, 13); pubiotomy, five; forceps, 17; forceps after induction, five; craniotomy, ten; spontaneous delivery, four; breech, two; version and extraction, four. Twenty-seven of the patients had been treated by induction of labour and the method preferred was the insertion of bougies. Medical induction with castor oil, quinine and pituitrin was not recommended in dealing with disproportion.

The Diagnosis of Disproportion.

The following procedures were made use of in the diagnosis of contracted pelvis: Pelvimetry, external and internal, manual and bimanual examination and vaginal examination. In the diagnosis of disproportion manual and bimanual examinations were used.

The ideals to be aimed at in diagnosis fell under two heads: (i) To endeavour to eliminate antenatally all those cases in which dystocia might arise on the score of proportions, and (ii) to prevent during labour futile efforts on the part of Nature to effect delivery when disproportion had become manifest.

The methods of diagnosis would be considered *seriatim*.

External Pelvimetry.—The external measurements taken were those with which they were all familiar, namely the interspinous, the intercrystal and the external conjugate. In drawing conclusions as to the size of the pelvis from these measurements the following were regarded as normal: Interspinous 26 centimetres, intercrystal 29 centimetres and external conjugate 20 centimetres. When the interspinous diameter was 23 centimetres, the intercrystal 26 centimetres and the external conjugate 18 centimetres, the pelvis was regarded as contracted. Then, too, if the difference between the interspinous and intercrystal measurements was less than two centimetres, it was regarded as abnormal and due to the splaying of the ilia.

Again, if the interspinous and intercrystal measurements were appreciably lessened, narrowing of the transverse diameter of the inlet was to be expected; while if, in addition to this, the external conjugate was lessened, general contraction of all the internal diameters would be present.

The value of external pelvimetry was stated to lie in the fact that they were given a mental picture of the obstetrical value or type of the pelvis in question and so it was comparatively easy to diagnose the presence of a contracted pelvis. It was said that external pelvimetry left them nearly as much in doubt as if they had never seen the patient with regard to the actual outcome in a given case, the relationship of the head to the pelvis being the most important factor in diagnosis and prognosis.

Pelvimetry of the outlet of the pelvis was regarded as of little value with the exception of the posterior sagittal diameter which was the distance between the last piece of the sacrum and the middle point of a line joining the tuberosities of the ischium. The opinion was held that the size of the posterior sagittal diameter would have a great influence on labour, for even if the transverse of the outlet were much lessened, a compensating increase in the posterior sagittal diameter would make up for this.

Internal Pelvimetry.—The following measurements were made by means of the internal pelvimeter and reliance was placed on the result: (i) The true conjugate and (ii) the transverse diameter of the brim. The prognosis of the eventual outcome of the case was not helped by these measurements, but they afforded an idea as to the

probable margin of safety in carrying out a trial of labour.

A true conjugate of 11 centimetres with a transverse of 13 centimetres was regarded as normal. A reduction in both measurements was regarded as a serious matter, while a reduction of the true conjugate combined with a normal transverse diameter allowed one to hope that a normal delivery would follow a mechanism such as occurred in the case of a flat pelvis, unless, of course, the contraction of the true conjugate was a major one.

The results obtained by X ray examination at the Rotunda were considered convincing and the possibility of this form of pelvimetry superseding the use of the internal pelvimeter in the future was mentioned.

Dr. Wilson said that this concluded what he had to say on the Rotunda methods of estimating contraction of the pelvis and he would pass on to consider the manner of estimating and the method of dealing with disproportion. Disproportion included those cases in which, either with or without pelvic contraction, the foetal head appeared not to fit into the brim of the pelvis. The foetal head was regarded as the most efficient pelvimeter and the manner in which it fitted into the brim formed an effective complement to the pelvimetry which had already been performed.

Manual and Bimanual Examination.—The methods used to estimate the degree of disproportion were: (i) The external method and (ii) the combined external and internal examination.

Of the external methods there were two in use. The first was Müller's method. Here the obstetrician stood with his back to the patient and pushed on the occiput and forehead of the foetus in the direction of the axis of the inlet. This should be done at intervals during the antenatal period and the first day on which the head failed to fit the brim was the day on which labour should be induced. Solomons had described a modification of Müller's method. The obstetrician sat by the side of the patient and grasped the head in the Pawlik grip; the fingers of the other hand, placed flatly on the head, pressed it down gently, while an assistant pressed down the foetus from the fundus.

In the combined method (internal and external) of Müller-Kerr two fingers of one hand were passed into the vagina with the palmar surface of the fingers anterior. The head was then pressed down into the pelvis by the other hand. This gave the "fit" of the head into the pelvis. The thumb of the right hand determined the amount of over-riding. The Rotunda views on this procedure were as follows: In a case in which no disproportion existed, and under anaesthesia, if the head was pushed down by the external hand against two fingers of the other in the vagina, the sensation obtained was as though nothing but a resilient elastic sheet, namely, the cervical tissues, separated the uterine contents from the vaginal introitus. Such was in fact the case, but if the case was one in which disproportion existed, then this sensation of elastic resiliency was almost immediately replaced by a hard bony resistance and any further descent of the head ceased.

If the prominence of the head was flush with the top posterior edge of the pubis, the prognosis was good. If the head lay flush with the anterior face of the pubis, then delivery could be only at the expense of moulding and if the head overhung the pubis in front, disproportion was almost certainly absolute. There were two fallacies to be remembered in this latter procedure, namely, the presence of incomplete flexion of the head and occipito-posterior presentations. Both of these conditions gave the picture of disproportion on account of the larger diameter of the foetal head attempting to fit into the brim.

The consistency of the foetal head was also noted, a soft skull moulding readily while the hard skull would not mould to the same extent.

Vaginal Examination.—The opinion was held that if by means of the finger in the vagina, the brim was palpable in its entirety as far back as the sacral ala and if the promontory could be reached, the case was one of contracted pelvis of marked degree. The size of the subpubic angle was considered of importance.

The Treatment of Disproportion.

In those cases seen antenatally, three methods for the treatment of disproportion were described: (i) Induction of labour, (ii) trial of labour at term and (iii) Cæsarean section.

With regard to induction of labour all that could be done was to conjecture what would happen and all such cases would not end in pelvic delivery. In a series of cases, 4,000 in number, between November, 1926, and November, 1928, there had been 294 classified as disproportion. Among these 52 inductions had been performed and of the inductions 28 came under the heading of "small measurements" and 24 under normal measurements. Delivery in the 52 inductions had been effected as follows: Spontaneous 36, forceps eight, lower segment section five, version and extraction one, spontaneous delivery after cephalic version one, spontaneous delivery after rotation from the occipito-posterior position one.

These figures were given as a reason for regarding induction of labour as an important line of treatment in such cases. It was said that one of the most important features in diagnosis and one which required more practice than anything else, was the knowledge as to when a given head would fit into a given pelvis, since the vast majority must be surrounded by a shroud of uncertainty until labour had removed the shroud, namely, the cervical tissues, and then measured the pelvis with the head.

The necessity for Cæsarean section after performance of induction was not regarded as a failure in obstetrical procedure because the lower segment section was done and this was considered to be safe after an aseptic induction.

In regard to trial of labour at term, this division comprised the vast majority of the cases. Pelvimetry, although carried out as a routine and regarded as useful in estimating the prognosis, was not relied upon to the same extent as formerly. Reliance was placed mainly on the progress of the foetal head through the birth canal.

The difference in prognosis between labour in a flat pelvis and that in a generally contracted pelvis was considered so slight as to be negligible.

Throughout the whole duration of the trial labour progress was watched by abdominal palpation and rectal examination. The latter was regarded as a very important diagnostic procedure. In most cases of disproportion the outcome was dependent on the ability of the presenting part to complete the full dilatation of the cervix and at the same time raise the bladder out of the pelvis. If this occurred, the child could almost certainly be delivered through the pelvis. If the cervical canal did not become completely dilated, then Cæsarean section was regarded as the only safe way out, if the foetus was alive. If it was dead, perforation was recommended if the true conjugate was not less than 5.5 centimetres.

A vaginal examination was made and this was generally the only one, after the membranes had ruptured and when all the information possible had been obtained from abdominal and rectal examinations. It was performed under anaesthesia according to the Müller-Kerr method.

Some interesting views were held on the subject of the retraction level or ring and the observance of this condition was made use of in conducting trial labour. It was held that the amount of work the uterus performed could be gauged from the palpation of the retraction level through the abdominal wall. Retraction ring was synonymous with Bandl's ring, but whereas the latter was regarded as a sign of threatened rupture of the uterus, the retraction level could be palpated much earlier than this stage of threatened rupture. In a normal case its height measured in fingers' breadths above the pubis gave a relatively accurate idea of the size of the os, since in a normal case formation of the lower uterine segment and dilatation went on *pari passu*. If the height of the retraction level led to the supposition that the os was fully dilated, but on rectal examination it was found that the os was only slightly dilated, that the cervix was not closely applied to the foetal head and that oedema from pressure was present, then it was justifiable to suspect that obstruction was present. The retraction level was really an indication of the tension of the lower uterine

segment. Its main value lay not in telling the dilatation of the os, but in giving the practitioner information as to the amount of labour a given patient had had when he was called in to attend her.

After the vaginal examination had been made, if there were no indications for delivery, labour was allowed to proceed and its progress could be followed by rectal examination during pains. Fœtal distress, as evidenced by excessive moulding and increased size of the caput, was regarded as one of the indications for delivery.

The Walcher position was considered a very useful adjunct in the conduct of cases of contracted pelvis.

To decide when the trial of labour should be terminated, the following criteria were adopted: (i) No appreciable descent of the presenting part during a pain and (ii) fœtal and maternal distress.

The treatment to be followed at this stage depended on the size of the os. If the cervix was fully dilated, forceps were applied and gentle traction made with the patient in the Walcher position. If the head would not descend with forceps traction, pubiotomy was performed and the child delivered. If the cervix was not fully dilated, lower segment section was performed and this operation was considered an ideal one in this type of case.

Dr. Wilson explained that the mention of pubiotomy as a means of treatment led him to give the Rotunda views on this operation. Many text books stated that in this operation all the diameters of the pelvis were increased. This was held to be untrue from observations made after dividing the pubis in a dried pelvis. It was stated that a very definite increase in the transverse diameter at the brim and also at the outlet was obtained, but that since the length of the true conjugate was dependent on the length and curvature of the ileo-pectineal lines which were fixed quantities, division of the pubis could not increase the true conjugate, unless the division of the bones were rendered excessive, that was a gap of 7.5 centimetres (three inches), which gave in an operation performed on a cadaver an increase of six millimetres (a quarter of an inch) in the true conjugate. The apparent increase obtained by observers in the past was due to the extrusion of the fatty contents of the space of Retzius together with the bladder through the rent in the bone.

Pubiotomy should never be performed until all the conditions for forceps delivery had been fulfilled and it was held that a lower segment section could be done in those cases where pubiotomy was indicated. It was fitting to state the Rotunda views on forceps applied to the head when it was high in the pelvis. There was but one position in which the head was suitable for forceps delivery, namely, on and distending the pelvic floor. Every head came to lie in this position once it had passed the brim, all other cases were high in the sense that the greatest diameter had still to pass and the degree of height could be estimated only by a final Müller-Kerr examination. In this way alone could practitioners be warned that by the application of forceps above the brim they were doing an operation far more dangerous than Cæsarean section in the lower uterine segment. It was these very cases which every day required recognition if the number of failed forceps cases and the present rate of maternal invalidism was to be appreciably reduced. The point must be emphasized that a portion of the caput might show at the introitus, even when the largest diameter had not passed the brim.

In regard to Cæsarean section, the varieties used were two in number: (i) the classical operation and (ii) the lower segment operation and the transperitoneal route was the one used.

To a large extent the classical or upper segment operation was restricted to those cases which presented absolute indications, while the lower segment operation was used where the indications were relative.

The advantages of the lower segment operation are regarded as: (i) The scar was covered, therefore there was less likelihood of infecting the peritoneum; (ii) the operation might be done in a potentially infected case; (iii) the scar was in a passive portion of the uterus; (iv) a subsequent pelvic delivery was considered safer when

the lower segment operation had been done; (v) a trial of labour might save section.

The disadvantages of the operation are regarded as: (i) For its performance the patient must be in labour and so the operation had often to be done at an inconvenient time. The operation had to be deferred until a well formed lower segment was present. (ii) The operation took longer to perform and was technically not so easy. (iii) The morbidity rate was higher and this was probably due to the fact that many of the patients were infected before operation.

Dr. Wilson said that he had not dealt with those cases of disproportion in patients who were admitted into hospital without antenatal supervision. There was not much to say in reference to these cases, as the method of treatment adopted would depend on the state of the patient on admission and would be one of the procedures already mentioned, according to which was most suitable to the particular case.

DR. J. A. CAMERON thanked Dr. Wilson for his interesting paper and said that the Rotunda figures for disproportion had been given by Dr. Wilson as being 4.4%. He compared this figure with that of his own series of three thousand cases in which the rate had been 1%. Amongst his patients had been several immigrants, so that the rate among Australian born women would have been still less. He agreed that all measurements of the pelvis were difficult to standardize and noted that the normal for the external pelvic measurements at the Rotunda had been greater than those he had been accustomed to regard as normal.

DR. ALEX. H. MARKS thanked Dr. Wilson for his paper and said that in regard to the question of internal pelvimetry he had seen at the Rotunda Hospital an internal measurement taken several times and that the result each time had been different for the one diameter. He thought it not of much practical value, as the result was not sufficiently accurate. He said that in Brisbane they were fortunate in that they had such a low incidence of disproportion in so much as it was a condition productive of much worry.

DR. D. GIFFORD CROLL said that they were under a debt of gratitude to Dr. Wilson and that he would not presume to criticize the Rotunda methods. He felt that if such an examination as outlined by Dr. Wilson had been made, then he would feel confident in saying what should be done in almost any case. He asked Dr. Wilson what was meant by regarding caput formation as a sign of fœtal distress and an indication for delivery. He thought that rectal examination might be uncomfortable for the patient.

DR. M. H. ELLIOT-SMITH thanked Dr. Wilson for his paper. He compared the teachings at the Rotunda in force six years ago with those of the present day. He said that when he had been there every patient with disproportion had been given a trial of labour, unless definite deformity of the pelvis had been present. Fitzgibbon had taught that external pelvimetry was of no value. Internal pelvimetry had been done frequently, but results had varied a little. It had been generally accepted that the head was the best pelvimeter. In regard to the management of trial labour, he said that vaginal examinations had been made more frequently then than now. The first had been made half an hour after rupture of the membranes and the second four hours later and the decision as to the final treatment had been made at the latter examination. He said that the condition of the cervix had been considered of importance, in that vaginal delivery might have been expected when it was fully thinned out, but that other methods of delivery would have had to be sought if a cervical cuff had been present. In regard to pubiotomy, he said that Fitzgibbon had supported it and had used it as an emergency operation when the patient had just failed to deliver herself. The indications for its performance had been considered a matter of experience and one not suitable for the average practitioner. It had been stated that its performance gave an increase of one centimetre in the transverse diameter of the brim and no more than that and that the permanent increase had been slight, not more than half a centimetre.

Dr. F. A. HOPE MICHOD said that they owed a debt of gratitude to Dr. Wilson for an extremely interesting paper and thought it an advantage to have similar papers. In regard to the question of pubiotomy, he asked Dr. Wilson if he had seen any patients on whom the operation had been performed some time previously. He himself had seen one such case and the disability consequent to the operation had been considerable.

In his reply Dr. Wilson thanked the speakers for their expression of appreciation. In regard to Dr. Croll's question regarding caput formation, he said that at the Rotunda they regarded caput formation accompanied by moulding of the head as necessitating careful observation of the foetus and caput formation alone was considered to indicate some degree of labour, but not foetal distress. Also that a variable heart rate of the foetus without caput formation and moulding of the head was not generally regarded as important. In regard to Dr. Michod's question concerning pubiotomy, he said that he had not seen any patients some time after the operation had been done and so could not express an opinion on the after-results. He expressed regret that none of the members had commented on the performance of the lower segment operation. He would have liked to have heard the opinion of members and said that he himself had never had occasion to perform other than the classical operation and his results had been such that he saw no reason to adopt the other.

MEDICO-POLITICAL.

THE following statement in regard to the agreement arrived at between the Tasmanian Branch of the British Medical Association and the Board of the Hobart Public Hospital has been received.

For thirteen years the Tasmanian Branch of the British Medical Association has held that it was against the best interests of the profession for members of the Association to accept appointments at the Hobart Public Hospital. During this period several attempts to bring about a more satisfactory state of affairs have failed. Now, after two years' negotiations between the Branch, the Hospital Board and the Government, an agreement has been reached; an honorary staff is to be appointed and members of the Association are recommended to apply for appointments, both as resident and honorary officers.

In June, 1928, acting on a suggestion of the medical representative, the Hobart Public Hospital Board suggested to the Branch that a conference should be held. Both parties expressed their desire for the introduction of the honorary system and their willingness to compromise on disputed points; but nevertheless, after three months it seemed that no agreement could then be reached and it was decided to wait for a report on the management of Tasmanian hospitals which the State Government had requested from Mr. R. J. Love. In June, 1929, the report was published and shortly afterwards negotiations between the Hospital Board and the Branch were resumed. Conferences and correspondence were continued for nearly twelve months, several disputed points delaying the final settlement until conditions acceptable to both parties were discovered.

The chief points in the final agreement are as follows.

The Surgeon Superintendent shall be a full time officer, with no right of private practice.

There shall be an honorary staff, consisting of two surgeons, two assistant surgeons, two physicians, two assistant physicians, one children's medical officer, one ear, nose and throat specialist, one oculist, one anaesthetist. It is recommended that there should be a radiologist and a pathologist, who should be part-time, paid officers. It is provided that, if any member of the existing staff of the hospital is appointed as honorary surgeon or physician, such office shall be an additional one in excess of the number stipulated above.

There is to be no fixed allotment of beds among the staff. If there is a vacant bed available it may be filled by a patient admitted under any of the senior honorary

officers or the Surgeon Superintendent; but any officer may, if he wish, limit the number of patients he will attend.

Every patient on admission shall have, as far as practicable, the right of choosing the officer who shall attend him, but may not after admission demand to be transferred to the care of a different officer.

Each physician and each surgeon including the Surgeon Superintendent shall have a receiving week in rotation and patients who do not exercise their right of choice, shall be admitted under the physician or surgeon receiving.

Honorary officers shall hold office for five years and shall be ineligible for reappointment, provided that there is another suitable candidate for the position. The age limit shall be sixty.

The whole of the honorary staff shall constitute a committee which shall be recognized by the Board as having the right to express the views of the honorary staff to the Board and shall be consulted by the Board when any change in the honorary staff is proposed.

The Association will give full and complete professional recognition to the existing staff of the hospital and will approve of its members working in harmony with them both inside and outside the hospital.

NOMINATIONS AND ELECTIONS.

THE undermentioned has been elected a member of the Victorian Branch of the British Medical Association:

Williams, Noel Swift, M.B., B.S., 1928 (Univ. Melbourne), 92, Church Street, Hawthorn, E.2.

Obituary.

CYRIL SHEPHERD.

DR. CYRIL SHEPHERD whose death was recorded in the issue of May 24, 1930, was a man of such versatility and of such personal charm that his passing will be regretted by a large circle both within the medical profession and beyond.

Cyril Shepherd was born in Yorkshire, England, on December 23, 1874. He was the son of Frederick Shepherd, banker. He went to Bedford Grammar School and, having decided upon medicine as a profession, graduated in 1898, becoming a member of the Royal College of Surgeons and a licentiate of the Royal College of Physicians. After graduation he entered the service of the Royal Navy. In the Navy he was a popular officer and it is said of him that from his earliest days in the service he was interested in ophthalmology. He would travel any distance to see a patient with an ophthalmic lesion. And so it happened that when he left the Navy, he determined to adopt ophthalmology as his specialty. The decision was amply justified, for he had a great capacity for taking pains. Dr. Parker has described these qualities of Shepherd so well that little need be added in this regard. His first appointment was that of Honorary Assistant Ophthalmic Surgeon to Sydney Hospital. His personal qualities were such that ere long he became popular with the other members of the staff and the common gatherings at afternoon tea in the outdoor department, though sometimes of necessity very hurried, were conspicuously brightened by his presence. He soon became recognized by his fellows as a sound and safe surgeon. Appointments to the staff of Saint Vincent's Hospital and the Women's Hospital followed in due course. He was also Honorary Consulting Ophthalmologist to "Greycliffe," the babies' hospital at Vaucluse. During the war Shepherd's services were valued by the military authorities and home service duties were assigned to him.

Shepherd was a most unusual man. He could adapt himself to strange conditions and by his attention to detail made himself master of whatever he undertook. His

interests outside his professional work were wide and varied. He belonged to the Royal Sydney Golf Club, to the Royal Prince Alfred Yacht Club, the Sydney Amateur Yacht Club, the Prince Edward Yacht Club and the Yacht Racing Association, to the Rose Bay, Kensington and Waverley Bowling Clubs and to the University Club. His sporting interests centred at various periods of his life in hunting, swimming, surfing, tennis, golf, polo, motor cycling, yachting and bowls. He was unusually successful in most of these. The messages of sympathy received by his wife from his non-medical associates have been numerous and the members of the medical profession join with them in their expressions of regret.

Dr. L. R. Parker writes:

My first meeting with Shepherd was when as his resident at Moore-cliff, giving an apparently perfectly good anaesthetic, my patient suddenly and utterly without warning ceased to breathe and beneath my startled and inexperienced gaze, proceeded quietly and insistently to die. Shepherd, having watched for a moment as I anxiously and without avail did first one thing and then another, then interposed quietly with: "What about pullin' out his tongue." This done, the patient arose, so to speak, from the dead, and the resident's nightmare, the Coroner's Court, receded into the distance.

This auspicious or inauspicious occasion inaugurated an association and friendship within whose twenty years' span I have always found, as on this occasion, that Shepherd was amazingly quick to perceive what was necessary and that this faculty was allied with an even more distinctive characteristic, namely, an iterated insistence that whatever had to be done must be done in the right way. There was nothing that he handled himself, his instruments, his racket, his clubs, his bowls, his motor cycles (twenty-eight of them) and the hundred and one other things that he did handle in his curiously diverse activities, which he did not manipulate with an admirable, but at the same time an orthodox, efficiency. This was not a matter of mere congenital adaptability, but was the logical outcome of the fact that he was always prepared to take those endless pains which are a *sine qua non*. If method and result are to approach perfection. I well remember him with a basket of tennis balls practising alone on a succession of afternoons until he made himself one of the most proficient reverse servers in Sydney. Similarly with golf I recall him on his own lawn indefatigably and eloquently practising and preaching the grips, stances, swings and all the other intricacies of the game, with an irrevocable insistence that they must be done the right way or not at all. It was only after tech-

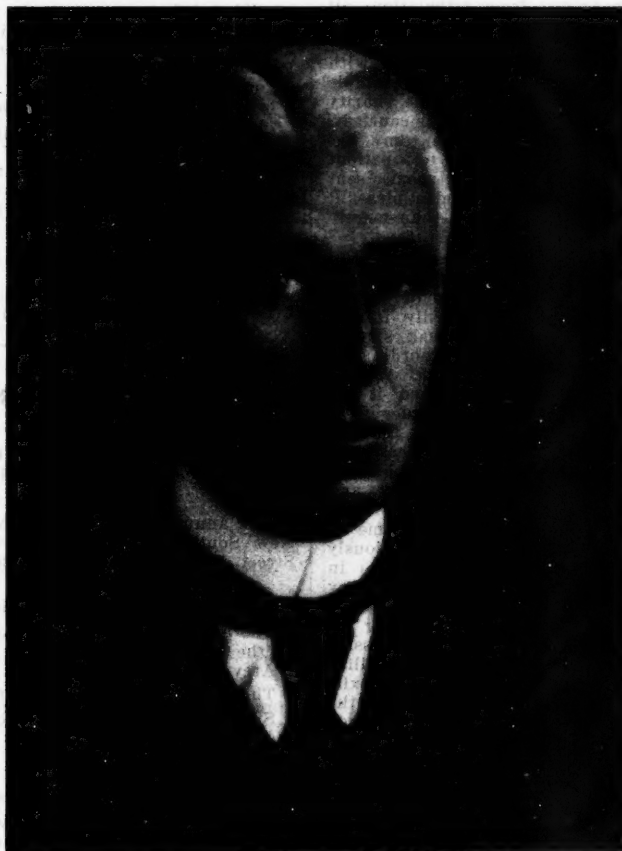
nique had been mastered that he gave any attention to results. Only the other day an ancient bowler who did not know I knew Shepherd from Adam, told me how an "eye doctor called Shepherd," a comparatively recent recruit to his club, who used to insist on the "rigours of the game" somewhat to the amusement of the more experienced but less orthodox exponents of the classic pastime, but who nevertheless, much to the general consternation, demonstrated the efficiency of his *modus operandi* by annexing the club championship from the venerable scoffers. Shepherd's yachting colleagues and crews tell with delight numberless yarns of his heated "scraps" on the everlasting question of correct detail.

Such methods as Shepherd's could only lead to success in whatever he embarked upon, so that an interrogation of various records, trophies, companions, colleagues dis-

closes the fact that in a life all too short and handicapped by long periods of illness and physical disability, he contrived to become an expert surgeon, a first rate golfer, a champion bowler, a good tennis player, a versatile skipper, a fisherman who could really catch fish, and, in his younger days, an intrepid polo player, motor cyclist and cross country rider. If to all this we add that he was a regular and forceful member of numerous clubs, associations and committees, that he played bridge like a book, was an accomplished dancer and amateur actor and a raconteur with a facile and whimsical sense of humour, it would still be found that *finis* was not yet written to the list of Shepherd's accomplishments. After all, none of us knew him during the first half of his life and surely there must have been something worth the telling in connexion with his school, hospital and naval careers. He spent ten years in the Navy and of that period it can only be related that at the end thereof he married a lady to whom at this time a very large number of

men and women of all ranks and classes make salutation in token of deep and abiding sympathy. All Shepherd's friends know that no account of him must be written in which the name of his wife is left out.

It must be remembered that the last ten years of his life had been more or less crippled by a series of disablements and illnesses which interfered seriously from time to time with his professional and other activities and it is a fine tribute to his tenacity of purpose that so greatly handicapped he achieved so much. It was delightfully typical of him that he did not suffer these slings and arrows gladly or with a semblance of Christian-like meekness (we wouldn't have liked him half so much if he had). On the contrary he would anathematize them in no uncertain tongue, just as he would you or any other person or thing which aroused his momentary ire. But



always the tirade against fate, fortune or fellow would end with a fluent jest, a quaint phrase, a whimsical smile.

For various reasons to those who knew him the term "distinguished" seems peculiarly applicable to Shepherd. Many of us might well envy his fine clear-cut appearance, his sporting record, his versatile humour, even the very way he wore his clothes; but most of all I think he was to be envied for the manner in which he discharged the various duties of his profession. As an ophthalmic surgeon he held the high respect of his colleagues. As a hospital honorary he was punctilious to the letter to both institution and patients. That he was a wise and generous mentor and adviser to the younger aspirants to his profession is evidenced by so many spoken and written tributes from all quarters since his death that I am amazed. As a consultant invoked to the aid of the harassed general practitioner he was ideal—his very appearance, his clearly expressed opinions and directions, his cheerful insistence on the probable happy emergence from tribulation—all conspired irresistibly to produce that inspiring impression and sanguine atmosphere which consultants were primarily created by the Almighty to produce. His dealings with patients of all classes and types might well be an example for all. That he had a strict honour and a fine charity goes without saying and so does his skill; but his courtesy, his delightful humour, his quaint expressions ("my secretary does the robbin'" I once heard him say to a patient who proffered him a fee in his consulting room) sent people away with a feeling that they had had a pleasant experience that he had done something more than merely "delivered them the goods."

Although I do not think even a chance observer could conceive that Shepherd was anything other than generous to an extreme in the matter of giving advice or service to anyone needing it, such a one might easily fail to imagine how curiously diffident he was to ask similar things for himself or his own and how extraordinarily grateful he was for the most trivial thing done. A man of his standing might well enough have taken it for granted that the services of any of his colleagues were willingly at his disposal, indeed in some sort that he was conferring a compliment in asking. Utterly the reverse. No man ever more apologetically troubled his brethren, more absolutely accepted their opinion and advice and was more supremely grateful.

For various reasons a great number of men, some of whom knew him very well, were not aware of how seriously ill he was during these last months and what was in process of happening. To these, many of them in Sydney and many scattered throughout the State, one would like to convey some suggestion regarding the manner of Shepherd's passing. In those last months of progressive weakness, disability and exhaustion in which that familiar but none the less grim syndrome, *algæa*, *anorexia*, *toxæmia*, *insomnia* was relentless and unrelenting and the inevitable finale was so patent to himself, he remained still the same Shepherd we have always known. He fought strenuously against the enemy at his gate, not only in deed, but with his own familiar words, but this fact is noteworthy, never with his own name on his lips, always that of his "wife and kids"—I use his own expression. To the last, though but a white shadow of his former self, he welcomed his friends with his inimitable smile, cracked his jokes, told his stories, read his "Punch," illustrated his technical points with pencil and paper, on his last conscious day describing in detail the various types of hunting in England, his own Counties of Cornwall and Devon in particular, and although an insistent dyspnoea compelled frequent and more frequent pauses, he insisted on completing the subject to its termination. And so to paraphrase W. T. Henley, clutched by fell circumstance, bludgeoned by fate, with his head bloody but unbowed, Cyril Shepherd, Old Shep., marched out at dawn on the 14th May in the fine company of those who to the end have remained masters of their fate and captains of their soul.

Dr. S. A. Smith writes:

The death of Cyril Shepherd has removed from a wide circle of friends a very striking and charming personality.

He was a man of the finest fibre. Enthusiasm inspired every aspect of his life at work or at play, in the consulting room and hospital ward, in the many sports he played so well, in his quieter moments with his closest friends and, above all, in his home. In his professional work there were decision, clearness of vision, honesty and, most refreshingly, a complete absence of pretence. These things, combined with the most delicate manipulative skill, carried him easily to a high place among his brethren and from this he never receded even in the last years of constant struggle against the enemy of disease which ultimately overcame him. Inclined by nature to some impatience, he achieved victoriously the most perfect patience in facing disease, inactivity and pain.

I have never known a man who loved sport more than he did, yet it did not distort his view of life and work and responsibility. Thorough and enthusiastic in everything he did, there was no game he attempted in which he did not become extremely proficient. But he valued the game and not the prize. His interest in his work and his sport did not absorb all the energy of an eager mind. He found much joy in books which were a great solace in days of enforced inactivity. Especially did he enjoy a brilliant essay, a sparkling satire or a crisp controversy.

Shepherd had almost a genius for friendship. Always generous in his estimates of those he liked, absurdly appreciative of the slightest manifestations of goodwill, outspoken in criticism, but charming in manner, he found the way to friendship easy with men of many types and diverse interests.

Those who knew him well in his home and with his family, rejoice in the memory of his domestic happiness. To his wife, his constant support, his sons and daughters we can say that there are many who share their loss.

Medical Societies.

THE MEDICAL WOMEN'S SOCIETY OF NEW SOUTH WALES.

The annual meeting of the Medical Women's Society of New South Wales was held at the Lyceum Club, Pitt Street, Sydney, on April 7, 1930.

Annual Report and Financial Statement.

The annual report and financial statement were adopted on the motion of Dr. L. Gullett, seconded by Dr. Constance D'Arcy. The annual report is as follows.

The Committee submits the following report.

Since the inception of the Society on December 8, 1923, the Medical Women's Society has progressed in a quiet but satisfactory manner.

Membership.

The number of members now stands at eighty, twenty-one new members having joined during the year.

Meetings.

In accordance with the rules, four quarterly meetings were held and also an extraordinary meeting in August, the average attendance being twenty. The Committee met on six occasions.

Addresses and Papers.

Dr. MARGARET HARPER gave an address at the meeting in June and in September papers were read on the subject of gonorrhœa in women, the speakers being Dr. D'Arcy, Dr. Leonard, Dr. K. Helms, Dr. M. Hamilton.

An invitation was accepted for those members of the Society who were on the staff of the Rachel Forster Hospital, to attend a special lecture on diathermy by Dr. H. Knowles in October. This lecture was well attended and was much appreciated by members.

Entertainments.

During the Australasian Medical Congress the Society entertained at luncheon at the Women's College on the first day of Congress all visiting medical women, including Dame Janet Campbell, and also Mrs. Abbott, wife of the President of the Congress, and the President and Chairman of the Rachel Forster Hospital, the women members of the Council of the Women's College and the President of the Women Graduates' Association.

On the last day of Congress the Society gave a dinner at Farmer's to the visiting medical women. At this the toast of the visitors was given by Dr. Gullett, supported by Dr. Dalyell. Dame Janet Campbell, Dr. Jean Craig (Victoria), Dr. E. Buckley (New Zealand), Dr. A. Wall (South Australia) and Dr. C. Walch (Tasmania) responded.

The final meeting of the year took the form of a theatre party to which women students in the final year of medicine were invited.

Demonstration of Cases et cetera at the Rachel Forster Hospital.

A successful demonstration was arranged by the Society in conjunction with the staff of the Rachel Forster Hospital as part of the programme of the Australasian Medical Congress. Many visitors from other States visited the hospital and showed keen interest in all its activities, particularly in the Venereal Diseases Clinic, where a special demonstration of cases was given.

Australian Federation of Medical Women.

The first meeting of the Australian Federation of Medical Women was arranged by the Medical Women's Society of New South Wales and was held in Sydney in September, 1929.

Medical women from Victoria, South Australia, Tasmania and New South Wales were present. The Queensland Medical Women's Society was represented by Dr. Kate Mackay (Victoria).

The Committee of the New South Wales Society was empowered to act as a temporary committee of the Federal body.

Election of Office Bearers.

The office bearers for the ensuing year were elected as follows:

President: Dr. L. Gullett.

Vice-Presidents: Dr. H. Biffin, Dr. C. D'Arcy.

Honorary Treasurer: Dr. A. Aitken.

Honorary Secretary: Dr. I. Saunders.

Committee Members: Dr. M. Hamilton, Dr. E. Sandford-Morgan, Dr. M. E. Edelsten-Pope, Dr. M. Bertram, Dr. Grogan, Dr. K. Helms and Dr. K. C. Cunningham.

Thanks to the retiring President and Secretary were expressed by acclamation on the motion of Dr. Gullett.

Australian Federation of Medical Women.

The provisional constitution as drawn up by representatives from New South Wales, Victoria and Tasmania at a meeting held in Hobart in January, 1930, was read and discussed together with the amendments suggested by the Committee of the Medical Women's Society of New South Wales.

Crippled Children.

An address on the work that is being done for crippled children by the medical officers of the Department of Education in conjunction with the Rotary Club was prepared by Dr. M. E. Edelsten-Pope and Dr. D. McClemons and was read by Dr. Edelsten-Pope.

The paper was listened to with much interest and a hearty vote of thanks by acclamation was passed on the motion of Dr. M. Little.

Post-Graduate Work.**THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.**

THE HONORARY SECRETARY of the College of Surgeons of Australasia has forwarded for publication the following notice, received from the Secretary of the Royal College of Surgeons of England.

Provided that not less than twenty-five eligible candidates are found to be desirous of being examined, the first examination in anatomy and physiology for the fellowship will be held at Melbourne in August or September, 1931.

The fee for admission to the first examination payable by a candidate to be examined in Australia is £25 and must be paid to the College of Surgeons of Australasia by candidates on receiving notice that they are eligible for admission to the examination.

The second or final examination for the Fellowship is held only in England and candidates for admission must have passed the first examination and be Members of the Royal College of Surgeons of England or have held for not less than four years a degree of a university recognized for the purpose which is registrable on the Medical Register of Great Britain or held together with some qualification registrable in Great Britain, and have spent one year after graduation in attendance upon the surgical practice of a recognized hospital or infirmary.

The following Australasian degrees are registrable on the Medical Register of Great Britain:

M.B., M.D., Ch.M., B.S., University of Sydney.

M.B., B.S., M.D., M.S., University of Adelaide.

M.B., M.D., B.S., University of Melbourne.

M.B., Ch.B., M.D., University of New Zealand.

Copies of the regulations and entrance forms with particulars of the required certificates can be obtained on application to the Honorary Secretary, the College of Surgeons of Australasia, 6, Collins Street, Melbourne, to whom examination fees must be paid by candidates on receiving notice that their entrance forms are in order and that they are eligible for admission to the examination.

The entrance forms, when completed by intending candidates, should be returned to the Honorary Secretary of the College of Surgeons of Australasia (for transmission to the Secretary of the Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.2) not later than April 1, 1931.

Any accepted candidate withdrawing will forfeit half of the fee paid.

Notice of the time and place of the examination will be given by the College of Surgeons of Australasia.

S. FORREST COWELL,

Secretary.

Royal College of Surgeons of England.

The following extracts from the regulations of the Royal College of Surgeons of England, relating to the education and examination of candidates for the diploma of Fellow, are published for the information of those desirous of being examined.

Section I. Examinations.

1. The examination for the Fellowship is divided into two parts, namely, the first examination and the second examination.

2. The subjects of the first examination are anatomy and physiology and the questions on these subjects may require an elementary acquaintance with comparative anatomy and physiology. The examination is partly written and partly *viva voce*.

3. The subject of the second examination is surgery, including surgical anatomy and pathology. The examina-

tion is partly written and partly *viva voce* and includes the examination of patients and the performance of operations on the dead body.

Section III. Conditions of Admission to the First Examination.

I. A member of the College is admissible to the first examination at any time after receiving the diploma of membership.

II. A candidate who is not a Member of the College, but who has passed the examination in anatomy and physiology for the Licence of the Royal College of Physicians of London and the Diploma of Member of the Royal College of Surgeons of England, is admissible to the first examination on production of a certificate of having dissected at a recognized medical school or schools for a period of not less than sixty weeks.

(Dissections during the regular vacations will be accepted up to a maximum of six weeks in any one year, provided the certificate shows that they have been performed under the superintendence of an authorized teacher in a medical school.)

III. A candidate who is neither a member of the College nor has passed the examination in anatomy and physiology referred to in paragraph II, but who is a member of a university recognized under the regulations of the Examining Board in England, is admissible to the first examination on production of the following certificates, namely:

1. Of having matriculated at a recognized university.
2. Of having completed the examinations in anatomy and physiology for the degrees in medicine and surgery of a recognized university.
3. Of having dissected at a recognized medical school or schools for a period of not less than sixty weeks.
(Dissections during the ordinary vacations will be accepted up to a maximum of six weeks in any one year, provided that the certificate shows that they have been performed under the superintendence of an authorized teacher at a medical school.)
4. Of having attended at a recognized medical school or schools:
 - (a) A course of lectures on anatomy during two terms.
 - (b) A course of lectures on physiology during two terms.
 - (c) A course of experimental physiology.
 - (d) A course of chemical physiology.
 - (e) A course of histology.

Section IV. Conditions of Admission to the Second Examination.

I. A member of the College is admissible to the second examination at any time after having passed the first examination on producing satisfactory evidence of having been engaged for not less than six years in the study (or study and practice) of the profession.

II. A candidate who is not a member of the College, but who possesses a qualification recognized by the Council for the purpose, is admissible to the second examination, after having passed the first examination, on the production of evidence of having been engaged in the study (or study and practice) of the profession for not less than four years subsequent to the date of obtaining the recognized qualification, one year of which shall have been spent in attendance upon the surgical practice of a recognized hospital or infirmary.

Any candidate who has not dissected for a total number of sixty weeks during his medical course must do the extra dissecting required at a recognized medical school.

Undergraduates who can produce the necessary certificates are eligible to sit for the examination.

The Universities of Adelaide, Melbourne, Sydney and New Zealand are recognized universities (Section III, Regulation 3).

The teaching hospitals attached to these universities, the General Hospital, Hobart, the General Hospital,

Launceston, and the Perth Hospital are recognized hospitals (Section IV, Regulation 2).

The College of Surgeons of Australasia will endeavour to arrange suitable courses of lectures for candidates for the examination. They are requested to notify the Honorary Secretary of the College of Surgeons of Australasia as soon as possible of their intention to present themselves for the examination. Early compliance with this request will facilitate the work of arranging these courses.

Correspondence.

UTERINE INERTIA.

SIR: In Dr. Wilson's interesting account of obstetric practice at the Rotunda Hospital he says: "The causes of uterine inertia are given as abnormal nerve impulses to the uterus, weakness of the muscle itself, or an abnormal 'hormonic' state." This does not seem very satisfactory. I would suggest that one cause may be a deficiency of vitamins in the mother's diet during pregnancy. There is some evidence (not, I admit, conclusive) that deficiency in vitamin A is one of the causes of puerperal septicemia. There is also some evidence (not yet verified in the human subject) that deficiency in vitamin B is a cause of weakness in the involuntary muscular system of the gastro-intestinal tract. Vitamin B is very likely to be deficient in the diet of many women and the physiological stress of labour is likely to render this deficiency evident. May not deficiency of this vitamin be one of the causes of uterine inertia?

I hope this will not be regarded as a theory or explanation of uterine inertia. It is only a suggestion which will, I hope, be put to the test by someone who has access to the necessary clinical material.

Yours, etc.,

A. JEFFERIS TURNER.

Brisbane.

June 16, 1930.

CASES RESEMBLING LARYNGEAL DIPHTHERIA.

SIR: In your issue of May 24, 1930, I was very interested to read Dr. F. Beare's record of cases resembling laryngeal diphtheria.

In May of 1925 I saw three children at Murray Bridge with a similar condition, one of which proved fatal. They all commenced in the same way as those described by Dr. Beare and as soon as the cough became croupy and the breathing stridulous, swabs were taken from the throat and although the latter showed nothing more than redness and slight swelling, large doses of antitoxin were given. No Klebs-Löffler bacilli were grown from the swabs.

Two of the cases gradually recovered and call for no special comment, but the fatal one is worthy of note. The child was a boy of sixteen months, well nourished and healthy until this condition commenced as an upper respiratory infection. On the second day I was called in because he had developed a croupy cough and spasms of wheezing with difficulty in breathing. I found the child restless and the respiration definitely stridulous. There was only a moderate temperature and the chest examination revealed remarkably few signs. He was put into a steam tent and ten thousand units of antitoxin were given at once. A few hours later he appeared much better, quiet, breathing easily and taking nourishment. Early the next morning the breathing again became difficult; retraction became pronounced and the colour rather blue. This spasm did not last long and he gradually became normal, but another of these spasms occurred during the afternoon and the child was removed to hospital. Several more doses of antitoxin were administered before the result of the swab

came to hand and the child was kept in a steam tent. In spite of this, however, the spasms became more frequent and severe, until on the third day after moving him into hospital, tracheotomy had to be performed during one spasm as suffocation seemed imminent.

It was interesting to note that the tracheotomy opening revealed a more or less normal appearance within the trachea. In spite of the tracheotomy the spasm continued and subcutaneous injections of atropine and even small doses of adrenalin were administered without having any effect whatever. Small inhalations of chloroform and hot mustard baths were also tried, but in spite of everything the child ultimately succumbed on the fifth day after admission to the hospital.

Never have I had a more distressing experience than with this case, due mainly to the fact that I had no idea of the real nature of the condition, nor could I find any literature on it and in addition, whatever one did appeared to have not the slightest effect on its progress.

In view of Dr. Beare's alarming figures as regards mortality, the disease must be regarded as a very serious addition to medical experience and appears, unfortunately, to be on the increase. My own experience at the time led me to believe that the condition was a specific infection characterized by a spasmodic contraction of the lower respiratory passages. Every support and assistance should be given those who are investigating this disease and our gratitude is especially due to Dr. Beare for his contribution.

Yours, etc.,

A. L. TOSTEVIN.

163, North Terrace,
Adelaide.

June 12, 1930.

MODERN VIEWS ON SOME OBSTETRICAL AND GYNÆCOLOGICAL PROBLEMS.

SIR: One or two statements in the excellent paper by Dr. K. Wilson under the above title call for criticism.

(1) "Treatment of Cancer of the Cervix.—There, too, after an extended operation, abdominal or vaginal, most of the surviving patients will have to regard themselves as more or less permanent invalids." The very reverse is the case; in the vast majority of instances those who recover from the operation, quickly regain health and strength and are both well and happy, capable of all domestic and wifely duties. I say this from close observation of women who have lived from twenty-two to two years after operation. The 15% to 20% mortality is, as Dr. Wilson says, serious, but it must be remembered that the operation is performed for a disease invariably fatal and, if patients would apply for treatment at an early stage, the mortality should be not higher than 8%, as Victor Bonney has proved. Radium cannot show anything like his 50% of permanent cures following operation.

(2) "Excessive uterine bleeding when no clinical lesion can be found . . . Radium gives the best and most certain results in those patients who have this complaint when they are at or near the menopause."

My criticism here is that all such patients show clinical lesions if these are intelligently looked for. They are increase in size and hardness of the uterus, cervicitis or some form of degeneration of a lacerated cervix; frequently adnexal disease. The condition has its origin in a chronic, slow sepsis and is a focus lowering the general health and constituting a grave danger from the possibility of cancer development. To treat such a condition by radium is to misapprehend its pathology and course. Radium acts mainly by atrophying the ovaries which even "at or near the menopause" exert a potent force in the health and comfort of women. Radium may control the bleeding, but it leaves untouched the septic focus in the cervix and does not exclude the danger of cancer. After radium it is admitted there is not the wonderful sense of well-being, the "new lease of life" feeling which follows total hysterectomy, sparing the ovaries.

As regards the relative mortality, when the unavoidable mistakes in diagnosis, the lighting up of pelvic abscess and peritonitis, the uncertainty as regards the future associated with radium treatment are taken into consideration, impartial judgement will give the verdict to operation as the safest and most effective treatment. If operation were undertaken only by those who had made honest and persevering efforts to gain in practical knowledge of operative procedures, I believe the operative mortality should not be more than one half of 1%. By my own technique I have done 501 total hysterectomies for non-malignant conditions with three deaths, two being from post-operative accidents and one from acidosis in a drug addict.

Yours, etc.,

RALPH WOBRAIL.

Lister Hospital,
Darlinghurst.

June 15, 1930.

A LONG UMBILICAL CORD.

SIR: It may be of interest to record the length of the umbilical cord of a recent case of mine. A boy born June 28, eight pounds weight, cord fifty-six inches long (142 centimetres). It was wound four times round the neck.

Some years ago I had a case with cord ten inches long. These, of course, are not records, but they are unusual.

Yours, etc.,

F. A. RODWAY.

Nowra, New South Wales.
July 1, 1930.

Congress Notes.

AMERICAN CONGRESS OF PHYSICAL THERAPY.

THE Secretary of the American Congress of Physical Therapy has forwarded an announcement of a post-graduate week of physical therapy in conjunction with the ninth annual scientific session of the American Congress of Physical Therapy, to be conducted from September 8 to 12, 1930, at the New Hotel Jefferson, St. Louis, United States of America.

An intensive post-graduate week of physical therapy is promised. Elaborate plans have been perfected for teaching, demonstrations and clinics. The medical practitioner who is interested in physical therapeutics and who has not had any instruction in the work will find the lectures on the fundamentals a sound basic means for further study. The more experienced, on the other hand, will gain considerably from the advanced expositions on light, heat, electricity, massage and all the other physical agents utilized in practice. Every phase of physical therapy will be covered. The subjects will be general and specific and so varied as to appeal to both the general practitioner and the specialist.

While it is appreciated that a week is a rather short period for post-graduate teaching, the systematic arrangement of the programme makes it possible for the medical practitioner to attend only those sessions in which he is vitally interested. As has been the practice in the past, sectional gatherings will prevail in medicine, surgery and eye, ear, nose and throat surgery. Several of the afternoons and evenings will be given over to addresses by prominent guests. There will be symposia on "Education and Teaching of Physical Therapeutics" and on "The Relation of the Physician and the Technician in Office and Hospital Practice." New features in the conduct of clinics and demonstrations will be observed. Further information may be obtained from the Executive Secretary, American Congress of Physical Therapy, Suite 716-30 N. Michigan Avenue, Chicago, Illinois, United States of America.

Books Received.

TWEEDY'S PRACTICAL OBSTETRICS, Edited and largely re-written by Bethel Solomons, M.D., F.R.C.P.I., M.R.I.A., Sixth Edition; 1929. London: Humphrey Milford, Oxford University Press. Royal 8vo., pp. 781, with illustrations. Price: 25s. net.

THE CLINICAL EXAMINATION OF THE NERVOUS SYSTEM, by G. H. Monrad-Krohn, M.D., F.R.C.P., Fifth Edition; 1930. London: H. K. Lewis and Company Limited. Crown 8vo., pp. 238, with illustrations. Price: 7s. 6d. net.

INFANT NUTRITION, A TEXTBOOK OF INFANT FEEDING FOR STUDENTS AND PRACTITIONERS OF MEDICINE, by Williams McKim Marriott, B.S., M.D.; 1930. St. Louis: The C. V. Mosby Company. Crown 4to., pp. 375, with illustrations. Price: \$5.50 net.

A SYSTEM OF BACTERIOLOGY IN RELATION TO MEDICINE, (Privy Council, Medical Research Council); Volume V; 1930. London: His Majesty's Stationery Office. Crown 4to., pp. 506. Price: 21s. net.

SURGICAL DIAGNOSIS, by American Authors, Edited by Everts Ambrose Graham, A.B., M.D., Volume III; 1930. Philadelphia and London: W. B. Saunders Company; Melbourne: James Little. Royal 8vo., pp. 1052, with illustrations. Price for three volumes: £7 10s. net.

Diary for the Month.

JULY 15.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

JULY 22.—New South Wales Branch, B.M.A.: Medical Politics Committee.

JULY 22.—Queensland Branch, B.M.A.: Obstetrical Section.

JULY 23.—Victorian Branch, B.M.A.: Council.

JULY 25.—Queensland Branch, B.M.A.: Council.

JULY 31.—New South Wales Branch, B.M.A.: Branch.

JULY 31.—South Australian Branch, B.M.A.: Branch.

AUG. 1.—Queensland Branch, B.M.A.: Branch.

AUG. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.

AUG. 5.—New South Wales Branch, B.M.A.: Post-Graduate Work Committee.

AUG. 5.—New South Wales Branch, B.M.A.: Hospitals Committee.

AUG. 6.—Victorian Branch, B.M.A.: Branch.

AUG. 7.—South Australian Branch, B.M.A.: Council.

Medical Appointments.

Dr. B. H. Morris (B.M.A.), Dr. F. S. Scott (B.M.A.) and Dr. W. H. Russell (B.M.A.) have been appointed members of the Nurses' Board of South Australia, under the provisions of the *Nurses' Registration Act, 1920*.

Dr. I. M. Brown has been appointed Medical Officer, Office of the Director-General of Public Health, New South Wales.

Dr. V. R. Harbison (B.M.A.) has been appointed Government Medical Officer at Manildra, New South Wales.

Dr. G. E. Williams has been appointed Medical Officer, Department of Mental Hospitals, New South Wales.

Dr. R. Maltby (B.M.A.) has been appointed Medical Officer of Health by the Wiluna Road Board, Western Australia.

Dr. A. R. F. Clarke (B.M.A.) has been appointed Medical Officer of Health by the Plantagenet Road Board, Western Australia.

Dr. E. A. Johnson has been appointed Deputy Inspector-General of Hospitals, South Australia.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes*, sought, etc., see "Advertiser," page xviii.

DIRECTOR-GENERAL OF PUBLIC HEALTH, SYDNEY, NEW SOUTH WALES: Honorary Medical Officers.

NEWCASTLE HOSPITAL, NEWCASTLE, NEW SOUTH WALES: Junior Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 21, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company, Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Mount Isa Hospital.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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